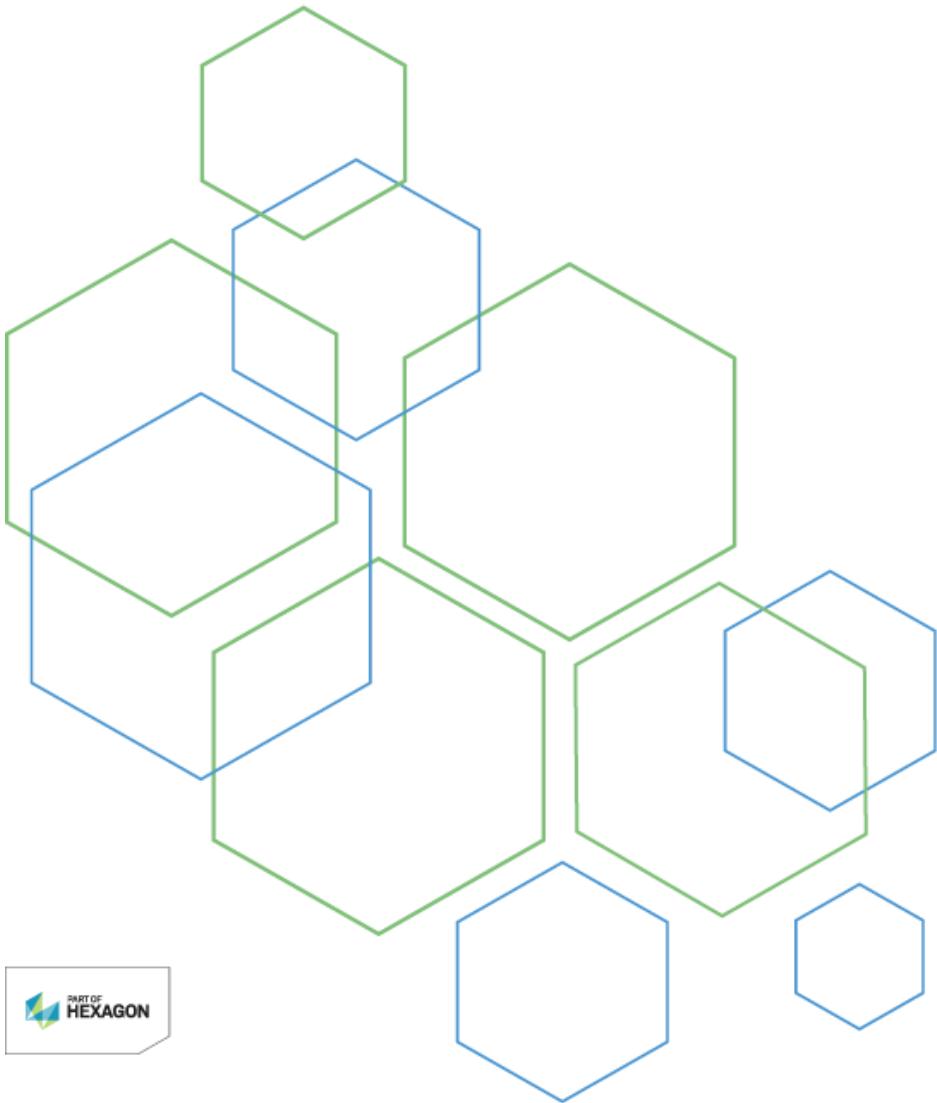


INTERGRAPH®
Smart → 3D
Global Workshare
User's Guide (SQL Server)



Version 2016 (11.0)
November 2016

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Preface

This document is a user's guide for the Global Workshare functionality of Intergraph Smart™ 3D and provides command reference information and procedural instructions.

Documentation Comments

For the latest support information for this product, comments or suggestions about this documentation, and documentation updates for supported software versions, please visit *Intergraph Smart Support* (<https://smartsupport.intergraph.com>).

What's New in Global Workshare

The following changes have been made to the Global Workshare Configuration.

Version 2016 (11.0)

- For Oracle databases, you can set the streams pool size value to maximize performance and avoid memory issues with the Oracle database by using the **Integrated Capture** mode to retrieve data. For more information, see Allocate streams pool size. (P1 CP:283238)
- Added new information about DuSS (Duplication Synchronization Service) installation. For more information, see *Install and configure the Duplication Synchronization Service (DuSS)* (on page 23). (P2 CP:262571, P4 CP:257548)
- Added new information on installing Oracle GoldenGate 12C. For more information, see *Install GoldenGate*. (P2 CP:263617)
- Added new information on how to verify if databases have GoldenGate replication enabled. For more information, see *Verify Databases are enabled for GoldenGate Replication*. (P2 CP:263617)
- Updated the following topics with new information related to Oracle GoldenGate 12C installation. (P2 CP:263617)
 - Verify Databases Have Supplemental Logging Enabled
 - Verify Databases are enabled for GoldenGate Replication
 - Edit the Undo Retention Value
 - Execute PreBackup scripts
 - Execute PostRestore scripts
 - Monitoring Replication
 - Firewall Exceptions for GoldenGate
- Added new information about the deletion of archive logs. For more information, see *Deleting Archive Logs*. (P2 CP:270198)
- To improve performance and stability with the GoldenGate implementation, the software now supports the **Integrated Capture** and **Integrated Apply** modes. For more information, see *Create the Smart 3D GoldenGate User Alias*. (P2 CP:272122)
- The Oracle GoldenGate software now provides basic support for Multitenant configurations. For more information, see *Create the Smart 3D GoldenGate User Alias*. (P2 CP:272122)

- Added new information on configuring two-way replication between SQL server models. For more information, see *Set up two-way replication between SQL Server models* (on page 19). (P4 CP:284327)

SECTION 1

Global Workshare

The Global Workshare Configuration (GWC) allows you to share all the data within one model structure with remote sites. Designed for companies running models from multiple sites (EPCs or Owner/Operators, for example) or for multiple companies that are working on a single model, the Global Workshare functions involve a single, central database in which all the changes come together as if they were created at the same site.

Pivotal in the sharing of data within a workshare environment are the geographical hubs known as locations. Two types of locations are required in order to share model data among multiple sites: host location and satellite location. The host location is a set of one or more database servers on a local area network (LAN) that contains the original set of databases associated with a site. The satellite location is a set of one or more database servers on a LAN that contains the replicated database associated with a site.

The host location is created automatically during generation of the site database using the **Database Wizard**. As such, the host location is the first location created. It is the site database generation process that also governs such things as the name, name rule ID, and server of the host location.

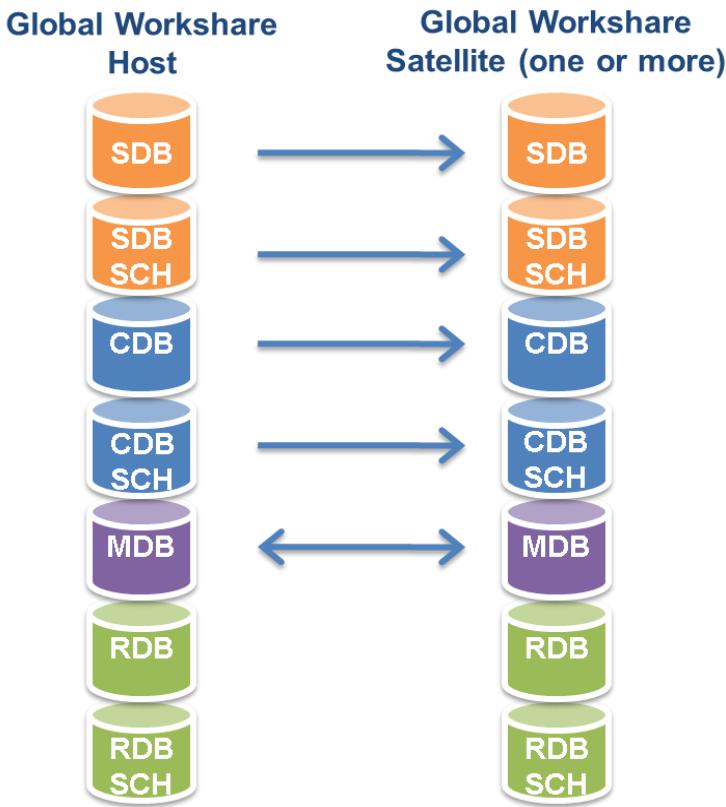
NOTE For more information about the site database generation process, see the *Installation Guide* available from **Help > Printable Guides**.

Satellite locations, on the other hand, are created manually within the Project Management task using the **Database > New > Location** command on the host. You must have administrator privileges on the Site database to create a new location. After they are created, locations can be associated with permission groups and models as part of the workshare replication process.

In the Global Workshare solution, data sharing between different locations is achieved through real-time model database replication of the entire model at all satellite locations. The catalog and catalog schema databases and the site and site schema databases are maintained on the host server while satellite locations have a read-only replication of these databases. Reports databases are regenerated (not replicated) at each satellite location.

NOTE Multiple models (in the same Site and Site schema) can be configured for Global Workshare provided they use the same set of locations as the first GWC. However, not all locations have to be involved in all workshares.

The following diagram illustrates the Global Workshare Configuration:



The site, site schema, catalog, and catalog schema databases are replicated in a one-way fashion. The one-way replication copies data from the host database server to each of the satellite servers, but it does not copy data from each satellite database back to the site, site schema, catalog, or catalog schema on the host server.

The implications are that all reference data modifications and permission group management must be performed at the host location for propagation to the satellite locations.

NOTES

- The SharedContent folder should be modified to point to a unique server at each of the satellite locations.
- Inserted reference files, which should be available at satellite locations, must be located in the SharedContent and be manually distributed to each satellite location. For more information about inserting files, see the *Common User's Guide* available from **Help > Printable Guides**.
- In a local area network (LAN) setup where multiple servers are being used in the same LAN, it is recommended that catalog databases in the host/satellite workshare point to the same SharedContent folder.
- In a wide area network (WAN) setup where multiple servers are spread across low bandwidth connections (ISDNs, Fractional T1s, and so on), it is recommended that catalog databases in the host/satellite workshare set point to a "close" SharedContent that exists on the same LAN as the database referencing it.

The model database is replicated in a two-way fashion with each satellite. Data is replicated between the host and each satellite. As a result, all satellite data is sent to the host, and then re-distributed from the host to the other satellites. Because of this form of replication, any work performed in the model at any location results in the same data being pushed to all databases that participate in the GWC.

NOTES

- After the GWC is established, use the backup tools in the Project Management task to create a backup set of the replicated databases from all locations. In the event of a corruption of data, you can recover the databases participating in the GWC and resume the replication by using any backup in the workshare.
- Configuring Global Workshare within an integrated environment is a detailed and complicated process. For more information, contact Intergraph Support at <http://www.intergraph.com/support>.

Network Requirements

Global Workshare requires a fractional T1 (256-384 Kbps) connection for large projects. Replicating data between the host and satellite is a latency-bound task, so increasing the bandwidth does not increase the replication delivery speed. Increasing the bandwidth can be helpful at setup time, but not over the course of the project.

The network latency between a workstation client and the local database server needs to be as low as possible.

Virtualization

It is possible to use virtual servers to implement a database server. You must test and verify that the environment is suitable for a production project and that the configuration allows you to reach your milestones on time. Performance or incompatibility problems could delay you. In most cases, the major performance bottleneck is caused by poor I/O which could be the result of improper hard drive configuration or overloading shared resources in the virtual server.

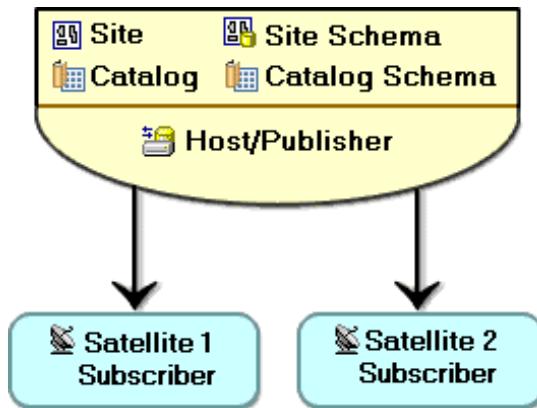
Global Workshare and SQL Server Databases

Before starting your configuration for Global Workshare with SQL Server, you need to decide how the data is managed or controlled.

For the Catalog, Catalog schema, Site, and Site schema, the Host should control the data. The other machines are Satellites of the Host. The Host is a **Publisher** of Catalog, Schema, and Model data to the Satellites and a **Subscriber** of Model data from the Satellites. The Satellites are **Subscribers** to the Host for Catalog, Schema, and Model data. They are **Publishers** of Model data to the Host. In small and midsize configurations, the database server is usually its own distributor. However, in the case of large configurations or multiple smaller configurations, it is possible to use a dedicated distributor server. You can specify whether you want to use a dedicated distributor server when you configure the SQL Server Distributor Agent.

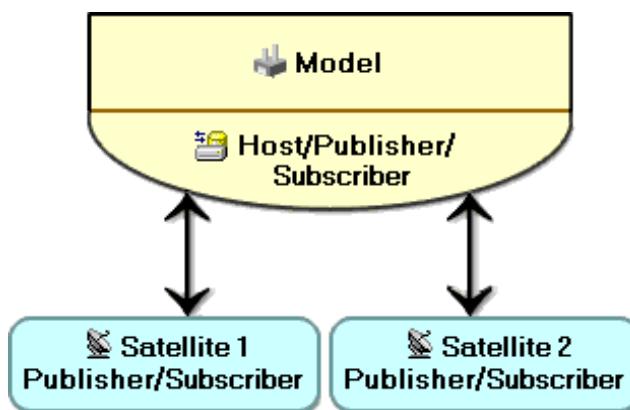
One-Way Transactional Replication

Using One-Way Transactional Replication, you have a Host machine for your Catalog, Catalog schema, Site, and Site schema. This means that the Host machine communicates information to your Satellite machines, but the Satellites do not communicate information back to the Host. The Host machine is the Publisher, and the Satellites are Subscribers. The communication is all one-way from the Host to the Satellites.



Two-Way (Peer-to-Peer) Replication

For the Model database, you set up Two-Way (Peer-to-Peer) Replication. The Host machine operates as both a Publisher and a Subscriber, pushing information to the Satellites and receiving changes from them. Likewise, your Satellite machines are Publishers and Subscribers so they can communicate changes to the Host and receive information from the Host. The communication is two-way.



The following workflow steps pertain only to configuring Global Workshare for SQL Server databases.

Project administrators manage all Satellite creation and administration from the Host location, and use permission groups to determine data access for both Host and Satellite locations.

NOTE The term "Peer-to-Peer" in SQL Server documentation is what we refer to as "Hub and Spoke" configuration.

The procedures below assume some familiarity with the Project Management environment for Global Workshare and are targeted to specific SQL Server settings. For more information, see your Microsoft SQL Server documentation.

Set Up a Configuration of Replicated Servers

Several steps are involved when setting up a first-time configuration of replicated servers for SQL Server.

NOTE The SQL Server Replication feature must be installed on the SQL Server instance set up for the Global Workshare configuration.

1. Configure each server for replication.
2. Set up a SQL Server Distributor Agent.
3. Create a profile for the distributor agent.

Set Up Global Workshare with SQL Server

After you create the SQL Server Distributor Agent, you can set up the Global Workshare configuration (GWC) for the SQL Server databases.

NOTE For information on setting up permissions for your data, see *Permission Groups and Global Workshare* (on page 56).

Set Up Replication Using the SQL Server Wizard

You need to set up one-way replication subscriptions for the Catalog, Catalog Schema, Site, and Site Schema. For the Model, use Peer-to-Peer, two-way replication.

- Set Up One-Way Subscriptions for SQL Server
- Set Up Two-Way Replication between SQL Server Models

Regenerate Reports Databases

For performance reasons, the Reports and Reports schema databases are not replicated from the Host location. Instead, at each Satellite location you must point to the Site and Site schema databases on the respective servers, right-click the model in the Project Management tree view, and then select **Regenerate Reports Database**. For more information on regenerating the Reports database, see the *Project Management User's Guide* available from **Help > Printable Guides**.

Add Satellites to Existing Global Workshare Configurations

After you have set up a Global Workshare configuration with SQL Server, you can add new Satellite locations to the existing configuration.

Remove Replication between a Host and a Satellite

You can remove the replication between a Host and a Satellite in a Global Workshare configuration with SQL Server.

You can also consolidate an existing configuration, or remove all replicated Satellites.

Disable Replication on a SQL Server Instance

If you need to "start from scratch", it can be useful to completely disable all replications within a SQL Server instance.

Monitor Replication in SQL Server

You can use the SQL Server Management Studio to monitor replication activity.

NOTE Configuring Global Workshare within an integrated environment is a detailed and complicated process. For more information, contact Intergraph Support at <http://www.intergraph.com/support>.

What do you want to do?

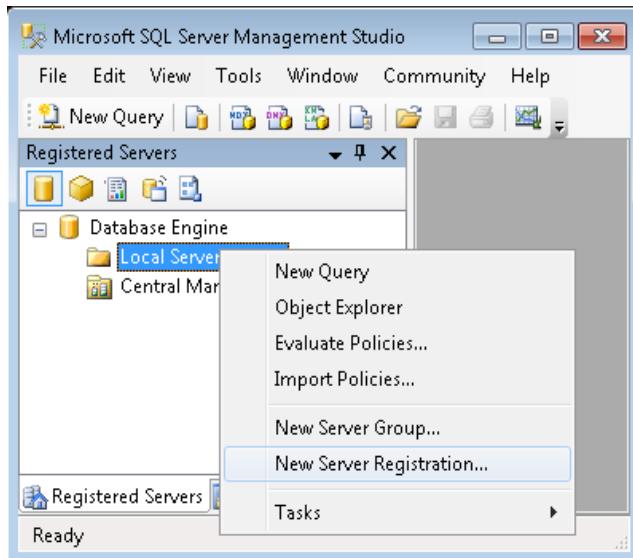
- *Configure each server for replication* (on page 14)
- *Configure the SQL Server Distributor agent* (on page 15)
- *Set the SQL Server Distributor agent profile* (on page 18)
- *Set up Global Workshare with SQL Server* (on page 18)
- *Set up two-way replication between SQL Server models* (on page 19)
- *Set Up one-way subscriptions for SQL Server* (on page 20)
- *Restore a satellite for SQL Server replication* (on page 22)
- *Regenerate the reports database* (on page 22)
- *Add an additional satellite to an existing SQL Global Workshare Configuration* (on page 24)
- *Disable replication on a SQL Server instance* (on page 25)
- *Monitor replication in SQL Server* (on page 25)
- *Remove SQL Server replication* (on page 25)
- *Consolidate an existing SQL Server configuration* (on page 27)

Configure each server for replication

All SQL Server servers that will take part in replication should be registered through the **Microsoft SQL Server Management Studio**. For more detailed information on the **Microsoft SQL Server Management Studio**, see your SQL Server documentation.

1. In the **Microsoft SQL Server Management Studio**, expand **Database Engine** in the **Registered Servers** window.

2. Right-click **Local Server Groups**, and select **New Server Registration**.



3. On the **New Server Registration** dialog box **General** tab, specify the name of the SQL 2014server that will participate in replication.
4. Click **Save**.

NOTES

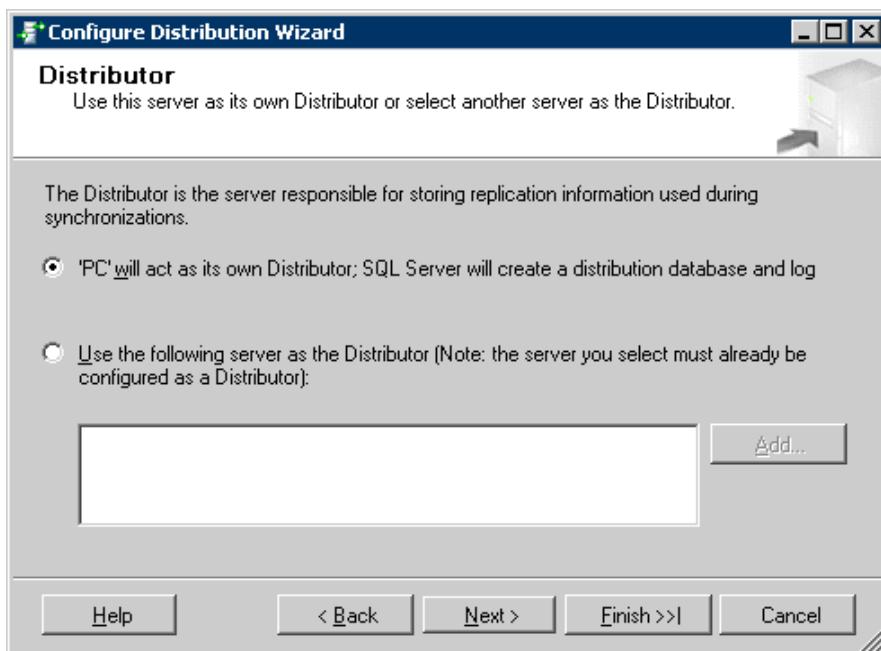
- When you select an SQL Server in the **Registered Servers** window, check the **Object Explorer** window to make sure that the SQL Server Agent is running.
- Make sure that the SQL Server Agent is running on all the database servers and that it is running using an account that has access to all the database servers. Do not use the local system account.
 - i. Select **Control Panel > Administrative Tools > Services**.
 - ii. Right-click **SQL Server Agent**, and select **Properties**.
 - iii. On the **General** tab, select **Automatic** as the **Startup type**.
 - iv. On the **Log On** tab, select **This Account**, and type a user name and password for a user that has access to the other database servers.
- You can use **Start > All Programs > Microsoft SQL Server > Configuration Tools > SQL Server Configuration Manager** to check the status of the SQL Server Agent. For more information, see your SQL Server documentation.

Configure the SQL Server Distributor agent

NOTE The SQL Server Replication feature must be installed on the SQL Server instance set up for the Global Workshare configuration.

IMPORTANT You must configure the distributor on each server participating in replication. This must be done before you start replication. For more detailed information on the **Microsoft SQL Server Management Studio**, see your SQL Server documentation.

1. In the **Microsoft SQL Server Management Studio**, right-click **Replication** in the **Object Explorer** window, and select **Configure Distribution** to start the **Configure Distribution Wizard**.
2. On the introduction page of the **Configure Distribution Wizard**, click **Next**.
3. On the **Distributor** page of the wizard, specify that each server will be its own distributor, and then click **Next** to continue.



NOTE Optionally, you can configure a dedicated Distributor server for large or complex configurations.

4. On the **SQL Server Agent Start** page, select **Yes, configure the SQL Server Agent service to start automatically** and click **Next**.
5. The next page of the wizard is the **Snapshot Folder** page. By default, the wizard points to a local folder on the server. Because the current version of Smart 3D does not support pull subscriptions for one-way replication or merge replication, pointing to a local folder is acceptable. Click **Next** to continue.

6. On the **Distribution Database** page, configure the distribution database, and then click **Next**.
?**TIP** For better performance, make sure the two folders specified are on drives that have ample free disk space and are *not* the computer's system drive.
7. Complete the remaining wizard pages as necessary for your situation and complete the configuration.

After you configure the SQL Server distributor, set up the distributor agent profile. For more information, see *Set the SQL Server Distributor agent profile* (on page 18).

Set the SQL Server Distributor agent profile

You must configure the distributor on each server participating in replication. This must be done before you start replication. For information on configuring the distributor, see *Configure the SQL Server Distributor agent* (on page 15). For more detailed information on the **Microsoft SQL Server Management Studio**, see your SQL Server documentation.

NOTE Repeat the procedure below for each registered server that participates in replication.

1. In the **Microsoft SQL Server Management Studio**, right-click **Replication** in the **Object Explorer** window, and select **Distributor Properties**.

The Distributor Properties dialog box appears.

2. Select the **General** page, and click **Profile Defaults** in the **Agent Profile** section of the page.
3. On the **Agent Profiles** dialog box, select the **Distribution Agents** page, and click **New** in the **Agent Profiles** section of the page.
4. In the **New Agent Profile** dialog box, select **Distribution Profile for OLEDB Streaming**, and click **OK**.

5. Set up the new agent profile as needed. For example: specify the name as "Sp3dProfile" and set an appropriate value (**2601:2627:50000:20598:532**) for the **SkipErrors** profile parameter. Click **OK** to accept the new profile settings.

The Agent Profiles dialog box now shows the new profile in the Agent profiles list.

6. Select the new profile and click **Change Existing Agents**.

SQL Server updates all existing Distribution Agents to use the specified profile.

7. Click **OK** to close the dialog box, and then click **OK** again to return to the **Object Explorer** window.

Set up Global Workshare with SQL Server

After you set up the SQL Server database servers, you can use the Project Management task to set up Global Workshare.

1. Add the Satellite locations and associate them with the name of the SQL Server database server. For more information, see *New Location* (on page 41).
2. Back up the SQL Server database.
3. Run **Tools > Duplicate Model for Workshare**. For more information, see *Duplicate Model for Workshare* (on page 46).

NOTE The **Duplicate Model for Workshare** command generates scripts that you must run to complete the process. The scripts are located in a subfolder named **Replication<ModelName>** in the local the temp folder. You can click **Start > Run** and type **%temp%** in the **Run** dialog box to locate the local temp folder.

4. From a DOS command line, run the **ToRunPreBackup.bat** file on the Host machine.

TIP You may want to redirect the output to a log file to check for errors later. For example: **ToRunPreBackup.bat >out**, which would output to a file called **out.log**.

5. Make a second backup of the databases and transfer the backup files to all Satellite locations.
6. Restore the backups to all satellite locations.
7. From a DOS command line, run the `ToRunPostRestore_n.bat` file (where *n* is the Satellite number on the model) for each location. These batch files can be run from the Host location or remotely to the other servers.

Set up two-way replication between SQL Server models

You use the **Microsoft SQL Server Management Studio** to set up two-way subscriptions for the Model. For more information on the Management Studio, see your SQL Server documentation.

NOTE The following procedure must be performed on the host machine.

1. From **Microsoft SQL Server Management Studio**, in the **Object Explorer**, right-click the publication created on the host machine for the appropriate database.
2. Expand **Replication > Local Publications**.
3. Right-click the Model database, and select **Configure Peer-to-Peer Topology**.

The Peer-to-Peer Topology Wizard appears.

4. Click **Next** to go to the **Publication** page of the wizard. Select the publication to which to add a new subscriber and click **Next**.
5. Right-click an empty area on the **Configure Topology** page, and select **Add a New Peer Node**.

The Connect to Server dialog box displays.

6. Select the first satellite in the **Server name** list, and then click **Next**.

The Add a New Peer Node dialog box displays.

7. Select the Model database from the **Select Database** list. Set the **Peer Originator ID** to **2** for the first satellite, and then click **OK** to close any open dialog boxes.

The wizard returns to the Configure Topology page.

8. Repeat steps 5 through 7 to add more satellite servers.

★ IMPORTANT Increment the **Peer Originator ID** in step 7 for each new satellite server you add. For example, set the **Peer Originator ID** to **3** when you add a second satellite.

9. On the **Configure Topology** page, right-click the **Host** server icon and select **Add a New Connection**.

A small arrow displays.

10. Extend the arrow to the first satellite server you added.

11. Repeat the previous two steps for each satellite you added.

NOTE To set up a **Hub and Spoke** configuration, make connections only between the host and each satellite. Do not connect a satellite to another satellite.

12. Optional: To configure a pull subscription for a satellite, right-click the arrow that links the host to that satellite, and then select **Use Pull Subscription**.

NOTE Although a pull subscription is more difficult to manage than a push subscription, a pull subscription delivers better replication performance on a high latency network. Consider using a pull subscription if the network latency is greater than 100 ms, such as when servers are located on different continents.
13. On the **Log Reader Agent Security** page, specify how the Log Reader Agent connects to each server. Click the ellipsis button to set up the connection information for each server on the **Log Reader Agent Security** dialog box. If the same user can connect to the host and satellite, check **Use the first peer's security setting for other peers**.
14. Specify a user name and password for the Log Reader Agent process. Click **OK** to accept the settings and return to the wizard.
15. Click **Next** on the **Log Reader Agent Security** page to continue to the **Distribution Agent Security** page, where you can specify a different user for each server or select the **Use the first peer's security settings for all other peers** check box.

If you click the ellipsis button, the **Distribution Agent Security** dialog box displays, allowing you to specify who can connect to the distributor. For the **Connect to the Subscriber** section, specify who has enough access on the remote server. Click **OK** to return to the **Distribution Agent Security** wizard page, and then click **Next** to continue through the wizard.

NOTE You can configure the distribution and log reader agent security details to run under the SQL Server Agent service account if all necessary database privileges are met for the actions that the agents will perform.
16. On the **New Peer Initialization** wizard page, we recommend that you select **I restored a backup of the original publication database, and the publication was changed after the backup was taken**, and then specify the location of the Model backup that was transferred to the other locations. Consult the SQL Server documentation for more information.
17. Click **Next** to continue.
18. Verify the choices you made in the wizard, and click **Finish** to process the peer-to-peer configuration.

Set Up one-way subscriptions for SQL Server

You use the **Microsoft SQL Server Management Studio** to setup one-way subscriptions for the **Catalog**, **Catalog schema**, **Site**, and **Site schema**. For more information on the **Microsoft SQL Server Management Studio**, see your SQL Server documentation.

NOTE Each user you specify in the wizards referenced in this procedure must have administrator privileges to connect to each server.

1. From **Microsoft SQL Server Management Studio**, connect to the Host machine.
2. In the **Object Explorer**, right-click the publication created on the Host machine for the appropriate database.
3. Expand **Replication > Local Publications**.
4. Right-click the Site, and select **New Subscriptions**.

*The **New Subscription Wizard** appears.*

5. Click **Next** to go to the **Publication** page of the wizard. Select the publication to which to add a new subscriber, and click **Next**.
6. On the **Distribution Agent Location** page of the wizard, select **Run all agents at the distributor**, and then click **Next**.
7. On the **Subscribers** page, select the remote server name. *Do not check **Subscriber** for the Host machine.* If you have more than one Satellite, select **Add Subscriber** and add all of the Satellite locations (one at a time) before continuing.
8. When you are finished adding **Subscribers**, click **Next** to continue.
9. On the **Distribution Agent Security** page, specify the security information for each subscription. Click the ellipsis button to display the **Distribution Agent Security** dialog box.

*Specify only users that can connect to the distributor. For **Connect to the Subscriber**, make sure you specify a user with enough access on the remote server. If you have more than one subscriber (Satellite), do this for each subscriber. Click **OK** to accept your security settings, and then click **Next** to continue through the **New Subscription Wizard**.*

NOTE The distribution and log reader agent security details can be configured to run under the SQL Server Agent service account provided all necessary database privileges are met for the actions that the agents will perform.

10. The next page of the wizard is the **Synchronization Schedule** page. The most common selection is **Run continuously**, but you should set it as needed for your database setup. Click **Next**.
11. On the **Initialize Subscriptions** page, *if you are sure the databases have not been modified since the backup*, clear the **Initialize** check box for the Catalog, Catalog schema, and Site schema, and click **Next**.

★ IMPORTANT Clearing the **Initialize** check box allows the subscription to start faster as no data needs to be sent to the server. However, if the data has changed since your backup, the remote server will not receive the changes. We strongly recommend avoiding modification of the databases and using the "quick start without initialization" option, especially in the case of larger databases, such as the Catalog database.

12. Click **Next** to **Create the subscriptions**, and then **Finish** on the final wizard page. The final wizard page should display a **Success** status when the subscription is created.
13. Run the **New Subscription Wizard** again for the Site schema, Catalog, and Catalog schema. *Do not* create a subscription for the Model database.

Restore a satellite for SQL Server replication

The tasks below are for restoring and restarting global workshare for SQL Server databases. Do not deviate from the following sequence of steps. Additionally, do not proceed to a subsequent step in the workflow until the previous step is complete.

Restore the Model

1. Stop the replication between the Host and Satellite.
2. Make a backup of the Host.
3. Send the backup of the Host to the Satellite.
4. Delete the database(s) at the Satellite.

💡 TIP From this point on, the following steps are the same as adding a new satellite.

5. Restore the backup of the Host.
6. Run the script PostRestore_[N].sql (where [N] is the satellite number on the Model).
7. Restore the peer-to-peer SQL replication between the Host and Satellite.

Restore the Catalog, Catalog Schema, Site, and Site Schema

1. Stop the replication between the Host and Satellite.
2. Make a backup of the Host.
3. Send the backup of the Host to the Satellite.
4. Delete the database(s) at the Satellite.

💡 TIP From this point on, the following steps are the same as adding a new satellite.

5. Restore the backup of the Host
6. Restore the SQL transactional replication between the Host and Satellite.

Regenerate the reports database

★IMPORTANT Before starting this procedure, check with your administrator to verify that all users are disconnected from the database.

1. Select a model database in the Project Management tree view.
2. Click **Edit > Regenerate Reports Database**.
The Regenerate Reports Database dialog box displays.
3. Review and, if necessary, edit the information displayed for the reports databases and servers.

4. Click **OK** to regenerate the reports database.

■ NOTES

- Reports databases must have unique names. If the reports database name you specify already exists, the software prompts you to either rename the database or reuse the existing reports database.
- If the software is unable to successfully create the reports schema, an error message displays and the process ends.

Install and configure the Duplication Synchronization Service (DuSS)

The Duplication Synchronization Service (DuSS) works with the database replication service to maintain a healthy model at each Global Workshare Configuration location. If users at different locations are working on unrelated objects within the model, or if they are working on related objects at different times, the basic replication engine handles everything, and the DuSS is not activated. However, if users at different locations are working on closely related objects in a model at the same time, the DuSS is required to step in and resolve conflicts by preventing certain inconsistencies and ensuring that the model data is accurate at all locations. The DuSS must be configured and running at each location within a Global Workshare Configuration. You must activate the DuSS at the Host and each Satellite location at the end of the Global Workshare setup.

Configure the Duplication Synchronization Service

1. Log on as an administrator on the local computer and add [Product Folder]\Smart3D\Core\Runtime] to environment path variable.
2. Click **Start > All Programs > Accessories > Command Prompt**.
■ NOTE If the computer is running on a Windows 7 or Windows Server 2012 operating system, you must open a command prompt with full administrator permissions. Type **CMD** in the **Run** dialog box, and press **CTRL + SHIFT + ENTER**.
3. Use the **cd** command to switch to *<Installation folder>\ProjectMgmt\Middle\bin*.
4. Type the following command line:
DuplicationSyncService.exe -I
■ NOTE To uninstall the Duplication Synchronization Service, type the following command line:
DuplicationSyncService.exe -u
5. Close the **Command Prompt** window.
6. Open **Start > All Programs > Intergraph Smart 3D > Database Tools > Modify Database and Schema Location** and set the **Site** database connection that needs to be processed by DuSS.
■ NOTE The **Site** database information must be set with the user account that is running the DuSS service.
7. Click **Start > Run**. Type **services.msc**, and then click **OK**.
The Services window is displayed.

8. In the **Services** window, right-click **S3D Duplication Synchronization Service** and select **Properties**.
9. Select the **Log On** tab and type a user who has local machine administrator privileges and access to Smart 3D databases.
10. On the **General** tab, set the Service to **Automatic**, and then select **Start**.
11. Click **OK**.
12. Open **Project Management** while connected to the Host server.
13. Right-click the model to configure for DuSS, then select **Properties**.
14. Under the **Databases** tab, scroll to the **Node for Duplication Synchronization Service** column, and type the name of the corresponding computer where the DuSS service was installed for Host and Satellite servers.

NOTES

- You must install Smart 3D software on the DuSS configured computer.
- If you have the Global Workshare environment on different Smart 3D software versions, then you must install a separate DuSS service for each version.

Monitor the Duplication Synchronization Service

The DuSS writes status information to log files that are located in the temp folder on the computer where the DuSS is running. The two log files used are Duss.logA and Duss.logB. The status information is written to one log file until it reaches a maximum size, and then the service switches over to use the other log file. Each time a log file is reused, the previous data is overwritten. In this way, the recent activity is always recorded without allowing the log files to become huge. You can monitor the DuSS activity by reviewing these log files.

Add an additional satellite to an existing SQL Global Workshare Configuration

1. Use the **New Location** command to add the location for the new Satellite. For more information, see *New Location* (on page 41).
2. Run **Tools > Duplicate Model for Workshare**. For more information, see *Duplicate Model for Workshare* (on page 46).

 **NOTE** The **Duplicate Model for Workshare** command generates scripts that you run to complete this procedure. The scripts are located in the `AddSatellite<LocationName>_<ModelName>` subfolder in the local temp folder. You can click **Start > Run**, and type `%temp%` in the **Run** dialog box to locate the local temp folder.

3. Back up the Model.
4. Transfer the backup to the new Satellite location, and restore the backup.
5. Run the `ToRunPostRestore_1<LocationName>.bat` file.

 **TIP** You may want to redirect the output to a log file to check for errors later. For example: `ToRunPostRestore_NewLocation.bat > out.log`, which would output to a file called `out.log`.

6. Set up the appropriate subscriptions between the Host machine and the new Satellite following the instructions in one of the following topics:

Set Up one-way subscriptions for SQL Server (on page 20) - Make sure you specify to **Initialize the subscription** as you go through the **New Subscription Wizard**.

Set up two-way replication between SQL Server models (on page 19) - For the Model database, on the **Peer-to-Peer Topology Wizard > New Peer Initialization** page, select the second option for a restored backup of an original publication database.

NOTE You can add a Satellite without shutting down all the activities at the other locations. However, make sure the correct options are selected in the SQL Server wizards. Refer to your SQL Server documentation for more information on the **New Subscription Wizard** and the **Peer-to-Peer Topology Wizard**.

Disable replication on a SQL Server instance

If you need to "start from scratch", it can be useful to completely disable all replications within a SQL Server instance.

For more information on the **Microsoft SQL Server Management Studio**, see your SQL Server documentation.

1. Open **Microsoft SQL Server Management Studio**. In the **Object Explorer**, expand the server instance name you want to disable.
2. Right-click **Replication**, and select **Disable Publishing and Distributor**.
3. Follow the instructions in the SQL Server wizard.

NOTE If a database uses two-way replication, as with the Model database, you still have to remove the replication coming from the other servers before you can delete the database.

Monitor replication in SQL Server

You can use the **Microsoft SQL Server Management Studio** to monitor replication activity. For more information on the **Microsoft SQL Server Management Studio**, see your SQL Server documentation.

1. From the **Microsoft SQL Server Management Studio**, in the **Object Explorer**, expand the server instance name that you want to monitor.
2. Right-click **Replication**, and select **Launch Replication Monitor**.

NOTES

- One very useful feature of the **Replication Monitor** is "tracer tokens" which allow you to measure the latency between the Publisher, Distributor, and the Subscriber. It is also useful to check the activity levels between the servers.
- You can also use the **Warnings and Agents** feature to configure alerts so an administrator can be notified by e-mail of any agent failures.

Remove SQL Server replication

Refer to your SQL Server documentation for more detailed information concerning the SQL Server steps in the following procedures.

NOTE In the following procedures, only delete the subscriptions relative to the Satellite that you want to remove. If you accidentally delete a subscription, you will have to send a backup to the other location and add the new subscription back in the **Microsoft SQL Server Management Studio** to recover the deleted subscription.

Delete a Subscription at the Host

Repeat the following steps for each server as needed: Catalog, Catalog schema, Model, Site, and Site schema.

1. In the **Microsoft SQL Server Management Studio**, select the Host server, and expand the **Replication** folder in the **Object Explorer** window.
2. Under **Replication**, further expand the **Local Publications** folder.
3. Right-click the subscription corresponding to the remote server to remove, and select **Delete**.
4. On the confirmation dialog box, select **Connect to Subscriber and delete record of this subscription at Subscriber also**, and click **Yes** to confirm the deletion.

NOTE If you do not have access to the subscriber, you cannot delete the record remotely. You have to gain access to the subscriber and remove the subscriptions from it directly.

Delete Subscriptions at the Satellites

This procedure is for the Model database only.

1. In the **Microsoft SQL Server Management Studio**, select the Satellite server, and expand the **Replication** folder in the **Object Explorer** window.
2. Under **Replication**, further expand the **Local Publications** folder.
3. Right-click the subscription corresponding to the Host to remove, and select **Delete**.

Delete the Unused Publication from the Satellite

1. In the **Microsoft SQL Server Management Studio**, select the Satellite server, and expand the **Replication** folder in the **Object Explorer** window.
2. Under **Replication**, further expand the **Local Publications** folder.
3. Right-click the appropriate publication, and select **Delete**.

NOTE If you do not delete the publication, SQL Server will not allow you to delete or restore the database from another backup.

Remove the Global Workshare Configuration between the Host and Satellite

In Project Management, use the **Tools > Consolidate Model from Workshare** command to remove the Global Workshare configuration between the Host and Satellite. For more information, see *Consolidate Model from Workshare* (on page 43).

Consolidate an existing SQL Server configuration

Refer to your SQL Server documentation for more detailed information concerning the SQL Server steps in the following procedure.

1. In the **Microsoft SQL Server Management Studio**, remove the replication between the Host and all Satellite locations. For more information, see the *Delete a Subscription at the Host* section in *Remove SQL Server replication* (on page 25). Follow the steps for each Satellite location in the Global Workshare configuration.
2. Under **Replication**, further expand the **Local Publications** folder.
3. Right-click the publications, and select **Delete** for each.
4. In Project Management, use the **Tools > Consolidate Model from Workshare** command to remove the Global Workshare configuration between the Host and one or more Satellite locations. For more information, see *Consolidate Model from Workshare* (on page 43).

SQL Database Maintenance

SQL Server contains additional maintenance procedures that can improve database performance. These procedures are performed directly in SQL Server—not in the Smart 3D software—and are performed by a SQL administrator. Detailed procedures are not described in this section.

Backing Up Transaction Logs

Transaction logs are backed up to release space on the transaction log file and to prevent indefinite growth.

In a Global Workshare environment, transaction log backups are only needed for the set of host databases. These databases experience the largest log file growth due to the **Recovery Model** property being set to **Full**. For more information, see *Recovery Models (SQL Server)* in *SQL Server Help*.

★ **IMPORTANT** Transaction log backups are not used for restoring databases. You should schedule Smart 3D backups for disaster recovery. For more information, see *Backup* in the *Project Management User's Guide*.

You can create a single maintenance plan for multiple databases (such as the site, site schema, catalog, catalog schema, and model that comprise a standard Smart 3D database set), or create a separate maintenance plan for each database.

For more information, see *Maintenance Plan Wizard* in *SQL Server Help*.

Updating Statistics to Optimize Queries

The SQL Server Query Optimizer uses database statistics to efficiently retrieve and update data. The Query Optimizer automatically updates statistics. You can also manually update statistics more frequently to improve query performance, especially when creating and updating drawings. You can use **UPDATE STATISTICS** or the Transact-SQL stored procedure **sp_updatestats**.

For more information, see *Statistics Used by the Query Optimizer* and *UPDATE STATISTICS (Transact-SQL)* in *SQL Server Help*.

Catalog Data Recovery for SQL Server

The workflow in this topic explains how to recover catalog data if there is a mismatch of information for the Catalog or Catalog schema databases between the Host and any of the Satellite locations in a Smart 3D Global Workshare environment. This workflow does not affect the replication of the Site or Model databases and involves a much smaller maintenance window than what is required when performing the full consolidation and duplication workflows used to recover a lost Satellite.

Recovery of catalog data consists of removing the replication link (represented by the subscriptions) that exists for the Catalog and Catalog schema databases. Removing these subscriptions is necessary so that the databases can be overwritten during the restore operation at the Satellite location. After the replication link is down, a backup of the Catalog database is made at the Host. This backup is then transferred to the Satellite location where it is restored, and the replication link is subsequently re-established.

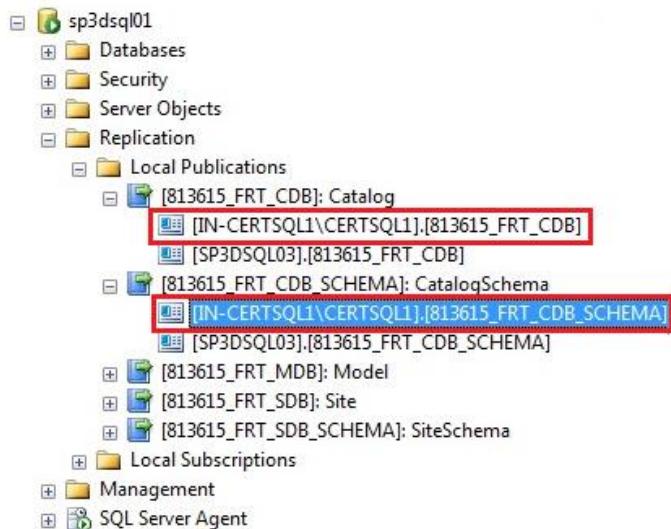
★ IMPORTANT The Catalog and Catalog schema databases must be recovered as a pair, even when only one of the databases is presenting a problem.

1. Suspend any activities that write data to the Catalog database at the Host. These activities include, but are not limited to, the following:
 - Bulkloading data into the catalog.
 - Creating catalog filters.
 - Using the **Copy to Catalog** command to copy assemblies into the catalog.
 - Modifying catalog data in the Catalog task.
2. At the Host and the Satellite location, make a backup of the Catalog database involved in the operation. This backup serves as a fail-safe recovery point. For more information, see *Create a backup file* in the *Project Management User's Guide*.

3. In the **Microsoft SQL Server Management Studio**, connect to the Host location and then remove the replication link between the Host and the Catalog and Catalog schema databases at the Satellite location being repaired. For more information, see *Delete a Subscription at the Host* in *Remove SQL Server replication* (on page 25).

NOTE If there are multiple Satellite locations, delete only the subscriptions for the Satellite location at which catalog is being recovered.

In the example below, the Catalog and Catalog Schema subscriptions outlined in red are being removed:



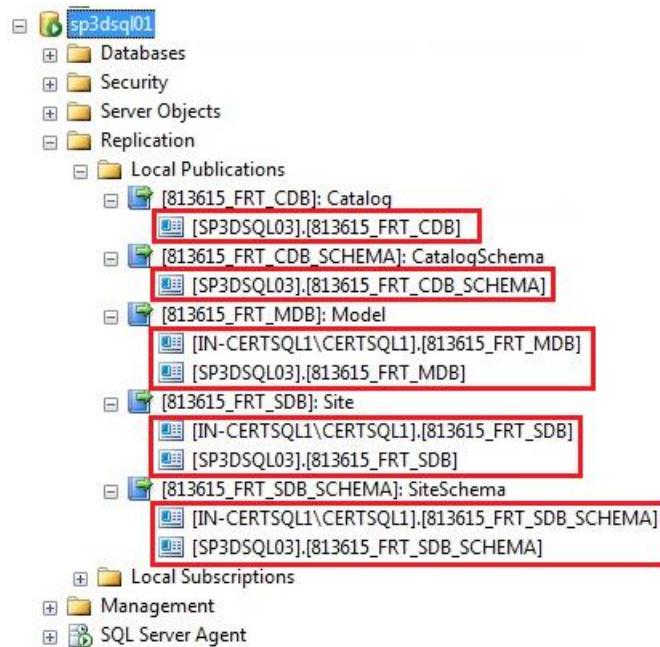
WARNING Do not delete the publication of the Catalog or Catalog schema databases (represented with the icon). Deletion of publications aborts the recovery workflow and requires a full consolidation and duplication of the Model at the Satellite location.

4. In the message box that displays, make sure **Connect to Subscriber and delete record of this subscription at Subscriber also** is selected, and then click **OK**.

NOTE To allow deletion of subscription records, the Satellite server must be running and accessible. Otherwise, these records must be deleted manually at the Satellite.

5. If prompted, provide login details for the Satellite server.

Only the subscriptions for the Model, Site, and Site schema databases remain, as shown in the example below:



6. At the Host location, navigate to the destination folder that you specified when the backup file was created, and then locate the .dat file for the catalog.

Name	Size	Type
SP3DTrain.bcf	1 KB	BCF File
SP3DTrain_CatalogBackup.dat	633,230 KB	DAT File
SP3DTrain_Model_Backup.dat	202,968 KB	DAT File
SP3DTRAIN_SDB_SiteBackup.dat	14,842 KB	DAT File
SP3DTrainBackup.log	3 KB	Text Document

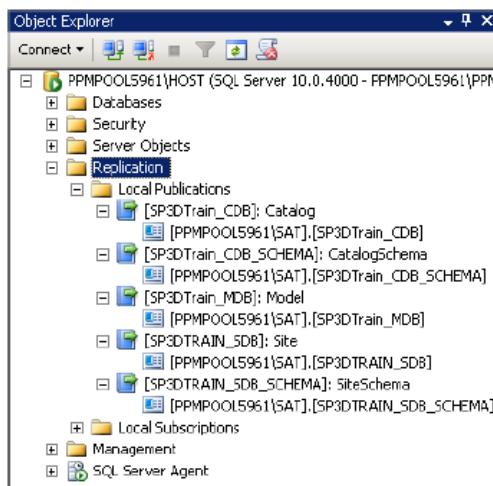
7. To send the backup file to the Satellite location, create a .ZIP file that contains only the compressed Catalog file data.
8. At the Satellite location, integrate the Catalog database backup file that was transferred from the Host into one of the Satellite backups.

When the integration is complete, the backup at the Satellite location consists of the four files required for a Smart 3D backup; however, the Catalog database contains the information from the Host server.

9. Open the Project Management task at the Satellite location.
10. Click **Tools > Restore**, and select the **Restore one or more Model databases from backup** option to restore the catalog. For more information, see *Restore a model from backup* in the *Project Management User's Guide*.

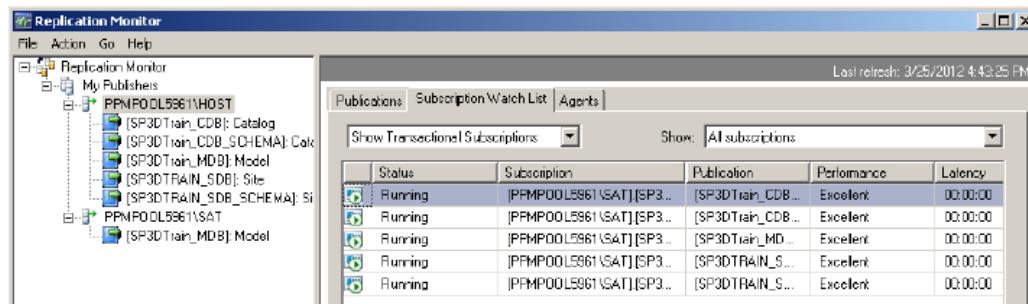
The software displays a warning that a catalog database with the same name currently exists in the server location and asks if you want to link the existing catalog database instead of restoring the catalog database from backup.

11. Select **No** in the message box to indicate that the catalog database should be restored and not be linked.
12. Select **Overwrite** in the next message box to overwrite the Catalog database.
13. Select **No** to prevent the Model database from being overwritten.
14. When the restore operation at the Satellite location is complete, review the log file for any errors.
15. Open the **Microsoft SQL Server Management Studio** at the Host location, and recreate the subscriptions for the Catalog and Catalog schema databases. For more information, see *Set Up one-way subscriptions for SQL Server* (on page 20). The example below shows the subscriptions for the five databases participating in the Global Workshare:



★ **IMPORTANT** When recreating the subscriptions, clear the **Initialize** check box on the **Initialize Subscriptions** page of the **New Subscription Wizard**.

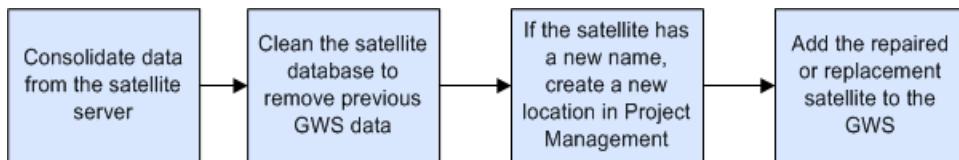
16. Open the **Replication Monitor**, and verify that replication of data for the new subscription is working appropriately. For more information, see *Monitor replication in SQL Server* (on page 25).



After you have verified that the replication of data for the Catalog and Catalog schema databases is working appropriately, normal activities can be resumed.

Satellite Failure and Recovery for SQL Server

The following workflow explains a procedure for recovering a Satellite server in the Global Workshare (GWS) environment. A server can fail due to hardware or other catastrophic failure. This procedure applies to systems using SQL Server only.



1. In **Microsoft SQL Server Management Studio**, expand the Host server, and select **Replication > Local Publications**.
2. Right-click the subscription that corresponds to the Satellite location, and then click **Delete**. Repeat this step for the Catalog, Catalog schema, Model, Site and Site schema.
3. In the **Microsoft SQL Server Management Studio** dialog box, select the **Connect to Subscriber and delete record of the subscription at Subscriber also** check box.
4. For the **Model database only**, delete the subscription at the Satellite.
5. Connect to the Satellite, and delete the Host subscription.
6. At the Satellite location, delete the publication that is now not used. Select **Replication > Local Publications**, right-click the publication that is no longer used, and then click **Delete**.
7. **NOTE** The publication must be deleted before you can delete or restore that database from another SQL Server backup.
8. If there are any remaining subscriptions related to the failed Satellite, right-click the subscription that corresponds to the Satellite, and then click **Delete**.
9. In the Project Management task, run **Consolidate Model from Workshare**. Select only the location that you want to consolidate. This location represents the one Satellite that is being replaced or repaired.
10. If the Satellite server is repaired, clean the Satellite database using *Clean a Database* in *Project Management User's Guide*.
11. If the Satellite server is a replacement computer with a different name from the failed Satellite server, delete the previous location object from within Project Management, and then *Create a new location* (on page 42) object for the replacement computer.

Add the repaired or replacement Satellite back into the GWS using *Add an additional satellite to an existing SQL Global Workshare Configuration* (on page 24).

See Also

Host Failure and Recovery (on page 53)
Model Data Recovery (on page 54)
Consolidate Model from Workshare (on page 43)

Task Limitations When Working in a Global Workshare Environment

Not all tasks can be performed at all locations participating in the Global Workshare Configuration (GWC). Some tasks can only be performed at the Host location; additional tasks can be performed at a Satellite location given that certain conditions are met. Consider the following before setting up a GWC:

Administrative Tasks

The following administrative tasks must be performed from a computer on which the Project Management option is installed:

NOTE In the following table, *Conditional* indicates that this action is dependent on the user having the normally expected privilege (as in a non-GWC setup) to the object being modified or deleted, or to the parent object if a child is being created.

Action	Host location	Satellite location
Execute Duplicate Model for Workshare command	Conditional	No
Create Permission groups	Conditional	No
Create Permission group folders	Conditional	No
Add user or group to permission groups	Conditional	No
Modify user or group in permission group	Conditional	No
Assign permission group to location	Conditional	No
Change SharedContent for the Catalog database	Conditional	Can execute only for the Catalog database at that Satellite location.
Regenerate the Reports database	Yes (for host)	Yes (for Satellite)
Add new properties to object types	Conditional	No
Create Location objects	Yes	No
Execute Synchronize Model with Catalog command	Yes (for Host)	Yes (for Satellite)
Database IFC	Conditional	Replicated from Host location.

Action	Host location	Satellite location
Bulkload to the Catalog database	Conditional	Replicated from Host location.
Run Database Integrity command	Yes	No

Running the **Synchronize Model with Catalog** command at the Host location has the following ramifications in a GWC setup:

- Items at Satellite locations that need updating are placed on the **To Do List** and can be resolved by running the **Synchronize Model with Catalog** command at each Satellite location. Alternately, each Satellite location can display the **To Do List** and update out-of-date items manually.
- Model database views are updated only at the Host location. Each Satellite location needs to run the **Synchronize Model with Catalog** command with respective options to update the views on their Model database. Alternately, a Satellite location can run the **View Generator** to update the model and/or catalog views. The ViewGenerator.exe file is delivered to the *[Product Folder]\Core\Tools\Administrator\Bin* folder.

Modeling Environment Tasks

 **NOTE** In the following table, *Conditional* indicates that this action is dependent on the user having the normally expected privilege (as in a non-GWC setup) to the object being modified or deleted, or to the parent object if a child is being created.

Action	Host location	Satellite location
View reference data in the Catalog task.	Yes	Yes
Use any of the commands in any of the Smart 3D tasks (excluding the Project Management and Catalog tasks).	Conditional	Conditional
Create/modify/delete objects under any system created in the Systems and Specifications task.	Conditional	Conditional
Create/modify/delete a new branch in the hierarchy tree in the Drawing and Reports task.	Conditional	Conditional
Create view styles.	Conditional	Conditional
Create/modify/delete catalog.	Conditional	No
Create/modify/delete model filters/filter folders.	Conditional	Conditional
Transfer selection set into permission group of another location	Conditional	Conditional

Action	Host location	Satellite location
Create/modify/delete items under the location-specific branch (Drawings and Reports hierarchy tree), including Report, Orthographic Drawings, Isometric Drawings, and the output they generate.	Conditional	Conditional

See Also

Global Workshare (on page 8)

Considerations for Performing Large Transactions

When you perform large transactions in Global Workshare, you need to take the following precautions:

- Perform large transactions during off-peak hours when system resources are not as heavily loaded.
- Break large transactions into smaller chunks. For example, use smaller select sets when deleting structure imported from TEKLA.
- Delete small sets of drawings or other objects rather than deleting a large set all at once.

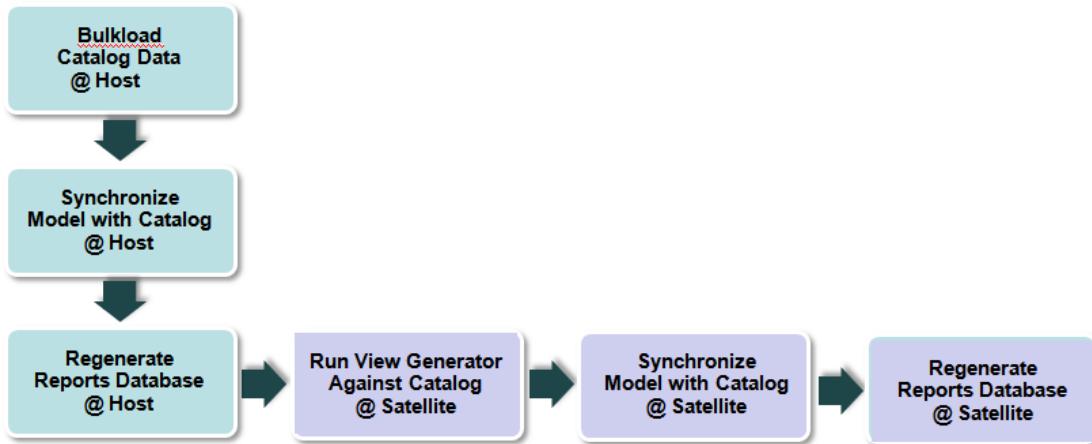
The following types of transactions can become large:

- Performing Model Data Reuse tasks.
- Performing Database Integrity tasks. Use the following workflow:
 - a. Run **DBI** on the Host from the Project Management task.
 - b. Run **DBClean** on the Host from a Smart 3D session.
 - c. Wait for the transactions to complete.
- Performing database maintenance. In particular, deleting database objects that users have deleted from the model can create a transaction with several million records. This can take days to replicate.
- Deleting existing TEKLA data before importing.
- Deleting large numbers of drawings. For example, deleting a snap-in of isometrics.
- Deleting large numbers of orthographic drawings.
- Deleting, copying, or moving large numbers of objects while inside the model.

Workflow to Synchronize Catalog Changes between Host and Satellites

The majority of catalog changes are propagated in the Global Workshare Configuration (GWC). However, if new catalog data is bulkloaded at the Host, the workflow depicted in the illustration below must be conducted on the Host server and on all Satellite servers in the GWC. This procedure regenerates the data that is not propagated to the Satellite and returns the workshare to a synchronized state.

★ IMPORTANT Intergraph does not recommend overwriting the Satellite catalog with a copy of the Host catalog and then linking it to the model. Doing so increases the risk of breaking the workshare.



Tasks Performed at the Host Location

1. Bulkload the required data to the Host catalog.
2. In the Project Management task, select the Host model in the tree.
3. Click **Tools > Synchronize Model with Catalog**.
4. In the dialog box, ensure **Mark out-of-date**, **Update out-of-date**, and **Regenerate views** are selected, and click **OK**.

*If the object is owned by the Host, the object is updated. If the object is owned by the Satellite, the object is flagged for update. If a **To Do List** record is necessary, one is created.*

5. Click **Edit > Regenerate Reports Database**.

The software updates the views at the Host only.

💡 TIP The Reports database is a set of views that point to data in other databases. Although the Reports database does not participate in the workshare, it must be kept up-to-date.

Tasks Performed at the Satellite Location

After the required tasks are completed at the Host location, perform the following tasks at each Satellite location participating in the GWC.

1. After replication has propagated changes from the Host to the Satellite, run the **View Generator** against the catalog at the Satellite location. The **View Generator** executable, ViewGenerator.exe, is delivered in the [Product Folder]\Core\Tools\Administrator\Bin folder. You must select the Catalog as the data database and the Catalog schema as the schema database to run this utility.
2. In the Project Management task, select the Satellite model in the tree.
3. Click **Tools > Synchronize Model with Catalog**.
4. In the dialog box, ensure that **Update out-of-date** and **Regenerate views** are selected, and click **OK**.

*The software updates the table content and the views on the model. Any objects that are owned by the Satellite are flagged or updated. If a **To Do List** record is necessary, one is created.*

5. Click **Edit > Regenerate Reports Database**.

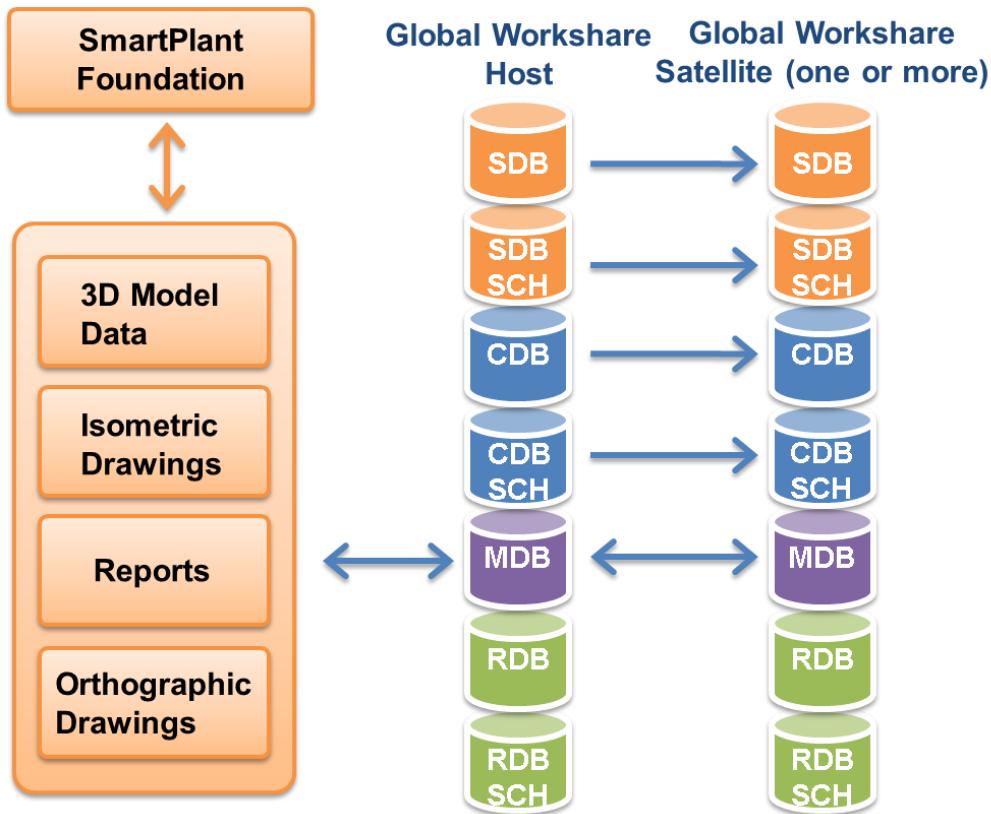
The software updates the views at the respective Satellite only.

NOTES

- **Mark out-of-date** instructs the software to scan the model database and mark all objects that are out-of-date with the catalog. In Workshare configurations, this option is disabled when the selected model belongs to a Satellite.
- **Update out-of-date** instructs the software to update all objects that have been marked as out-of-date in the model database. In Workshare configurations, this option is available for both Host and Satellite locations.

Combining SmartPlant Foundation and Global Workshare

In an integrated environment, SmartPlant Enterprise publishes and retrieves data through a central repository, SmartPlant Foundation (SPF). A global workshare configuration (GWC) environment shares all data within one model with multiple remote sites. You can combine the two environments, allowing the use of a central repository at remote sites. A typical configuration is shown below:



The software supports publishing to SPF for all levels of access, write or read-only. For example, you can publish documents in permission groups owned by a Satellite on the GWC Host or another Satellite even if you do not have write permissions in those permission groups.

★ IMPORTANT

- **Revise** and **Update** are available only if you have write access permissions.
- When publishing from other locations, read-only documents cannot be updated with the last published timestamp. The software detects these drawings as new.

The following practices must be followed for effective coordination of SPF and GWC:

1. All data retrieval must be performed on one GWC Host or Satellite. The permission group used for retrieval must only be available on that same Host or Satellite. This prevents a design basis object from being moved so that it has ownership in multiple permission groups and on multiple GWC sites. If this design basis object is later modified, it fails. Despite this restriction, GWC replicates all retrieved objects to all sites. For more information, see *Retrieving Data* in the *Integration Reference Guide* and *Permission Groups* (on page 56) in the *Global Workshare User's Guide*.
2. Smart 3D model registration with the SPF site must be performed on the GWC Host. For more information, see *Register* in the *Integration Reference Guide*.

For more information, see *Publishing 3D Data* in the *Integration Reference Guide*, and *Permission Groups and Global Workshare* (on page 56) in the *Global Workshare User's Guide*.

New Location

New > Database > Location creates a new location object. A location is a geographical place, such as a city, country, or some other region. A location can also identify the purpose of a computer involved in a Global Workshare Configuration, such as **Host**, **Satellite1**, or **Satellite2**. The location can be any string identifier that represents an informative name for the location. Data is typically transferred between workshare locations consisting of a host and its various satellites.

Unlike permission group objects that are available only to the given model database, the location object is a site-wide object. After a location is created, it is available to any model in the site.

NOTE **New Location** is not available at satellite locations. New locations can only be created at the host.

Create a new location

1. Click **Database > New > Location**.
2. In the **New Location** dialog box, type a name for the location.
3. In the **Site server** list, select the site server for the new location.

NOTE Only those servers that are registered through SQL Server on the Host computer are available. For more information about registering a server, see the *Intergraph SmartTM 3D Installation Guide* available from the **Help > Printable Guides**.

4. In the **Name rule ID** text box, modify the name rule if necessary.

TIP The **Name rule ID** is useful in determining which location placed a specific item in the model.

NOTES

- By default, the value in the **Name rule ID** field is identical to the value of the **LocationID**. The **LocationID** is an integer generated by the software. Because the Host site is created first, its value is 1. The first Satellite location created is given a value of 2, and so on.
- After a location is created, its properties cannot be modified and can only be deleted when the Global Workshare is not active.

New Location Dialog Box

Sets options for creating a new location. The first location, or Host location, is created automatically during the Site database generation process.

See Also

New Location (on page 41)

Create a new location (on page 42)

General Tab (New Location Dialog Box) (on page 43)

General Tab (New Location Dialog Box)

Specifies general information for the new location.

Name

Specifies the new location name. A location can be a city, country, or any other region. A location can also identify the purpose of a computer involved in a Global Workshare Configuration, such as **Host**, **Satellite1**, **Satellite2**, and so on.

Site server

Sets a site server for the new location. Only those servers that are registered on the Host computer through SQL Server are listed.

Name rule ID

Specifies the name rule ID. This string appears as part of the name rule for new objects created by the Satellite location.

See Also

New Location (on page 41)

Consolidate Model from Workshare

Merges back replicated databases on one or more Satellite servers to the databases on the Host server so as to form a single database of each type. You can use this command to consolidate a single satellite, multiple satellites, or all satellites. If the databases from all the satellite locations are consolidated, the resulting merged databases resemble the original databases and users can work with them as if the databases were never replicated or, at a point later in the design process, the databases can be replicated again with either the same or with different satellite locations.

Additionally, permission groups that were assigned to the selected Satellite locations for the duplicated model are re-assigned to the Host location for a consolidated model.

NOTE Starting with version 2007 (7.0), you can use the **Consolidate Model from Workshare** command to remove a selected satellite from a workshare configuration without being forced to consolidate all models back to the host.

See Also

Consolidate Models from Workshare Dialog Box (on page 44)

Consolidate Models from Workshare Dialog Box

Displays information about the model to be consolidated and provides a grid control that lists the **Location**, **Type**, **Server**, and **Name** of the duplicated Model databases. You can use this grid to select one or more satellites to consolidate back to the host location. Selecting a row header to consolidate a Model, highlights all rows for that Model. Each location plus databases combination is selectable as a unit. If you do not select anything, then the entire workshare is consolidated.

Select duplicated models to consolidate

Displays the location, type, server, and name for the duplicated model. You can use this grid to select one or more satellites to consolidate back to the host location. If you select a row header to consolidate a model, all rows for that model are highlighted. You cannot select just one row of the grid. You must select at least one model before the **OK** button is enabled.

See Also

Duplicate Model for Workshare (on page 46)

Global Workshare (on page 8)

Duplicate the Model for Global Workshare Configuration (on page 46)

Location Properties Dialog Box

Displays property information for the location that you selected in the tree view. The information cannot be edited.

Property

Organizes the details about the location in this column of the grid.

Value

Specifies the appropriate facts about the location in this column of the grid.

Name

Displays the name of the selected location.

Site server

Specifies the name of the server for the selected location.

Naming String

Specifies the name rule ID that is assigned to the selected location.

Duplicate Model for Workshare

The **Tools > Duplicate Model for Workshare** command collects the name of the model to be replicated, the Satellite locations involved in the workshare, and the Satellite server names for the various databases. After the information is collected, the command generates the replication scripts. You can add one or more satellite locations to an existing global workshare without having to first consolidate all the satellite locations.

The **Duplicate Model for Workshare** command is only enabled when a Model database is selected in the tree view at the Host location. Satellite locations cannot duplicate models. **Duplicate Model for Workshare** cannot be run on satellite locations.

⚠ CAUTION No modeling should occur on the Host or Satellite machines during the Duplication process. Any work performed during this process, such as the creation of new objects or filters, could be lost if they are not included in the backup of the databases.

See Also

Duplicate the Model for Global Workshare Configuration (on page 46)

Global Workshare (on page 8)

Duplicate Model for Workshare Dialog Box (on page 47)

Duplicate the Model for Global Workshare Configuration

Before starting this procedure, we recommend that you create a backup of the non-replicated databases. You must have also added the locations for any satellites you intend to add. For more information, see *New Location* (on page 41).

⚠ CAUTION No modeling should occur on the Host or Satellite computers during the Duplication process. Any work performed during this process, such as the creation of new objects or filters, could be lost if they are not included in the backup of the databases.

1. In the tree view, select a Model (Model database).
2. Click **Tools > Duplicate Model for Workshare**. You can also right-click on the model in the tree and select **Duplicate Model for Workshare**.
3. On the **Duplicate Model for Workshare** dialog box, select one or more Satellite locations in the **Available locations** list and click **Add**.

💡 TIPS

- For each location selected, one row for each database type is added to the grid.
- You can remove a location from the **Locations and servers where model will be duplicated** grid with the **Remove** button.
- You can add one or more satellites to an existing Global Workshare Configuration without consolidating other satellites.

4. Click **OK** to start the duplication process.

NOTES

- A variety of replication scripts and a batch files are generated during execution of the **Duplicate Model for Workshare** command. These files are generated on the Smart 3D administrative computer on which the command is executed and delivered to sub-folders created in the local *temp* folder of the user executing the replication process.
- You can click **Start > Run** and type **%temp%** in the **Run** dialog box to locate the local *temp* folder.
- In the initial duplication of one or more satellites, the files are created in the *ReplicationModelName* subfolder of the local *temp* folder. When a single satellite is added to an existing Global Workshare Configuration, the files are created in the *AddSatellite<LocationName>ModelName* subfolder and the batch file names are *ToRunPrebackup.bat* and *ToRunPostRestore_<n>.bat*, where *<n>* is a sequential number with 1 being for the host, 2 being for the first satellite, 3 for the second satellite, and so forth.
- For disaster recovery purposes, it is recommended that you backup these scripts and batch files into a separate folder.

5. When the duplication process completes, click **OK**.

Duplicate Model for Workshare Dialog Box

Sets options for the Satellite locations that will be involved in the workshare and the Satellite server names for the various databases.

Model to duplicate

Displays the name of the model database selected in the tree view. This model is duplicated at each of the specified Satellite locations.

Available locations

Lists all of the Satellite locations. You can use the Windows **Shift** and **Ctrl** select options for multiple locations.

Locations and servers where model will be duplicated

Displays the locations you have added to the table, as well as the database types, names and servers. Only those servers that are registered on the Host computer through SQL Server are available for selection and association with the location.

Add

Moves the location selected in the **Available locations** list to the **Locations and servers where model will be duplicated** table. For each location selected, one row for each database is added to the table. Note that the Reports and Reports schema databases are excluded from the duplication process. You must regenerate the Reports databases at each Satellite location after replication is complete.

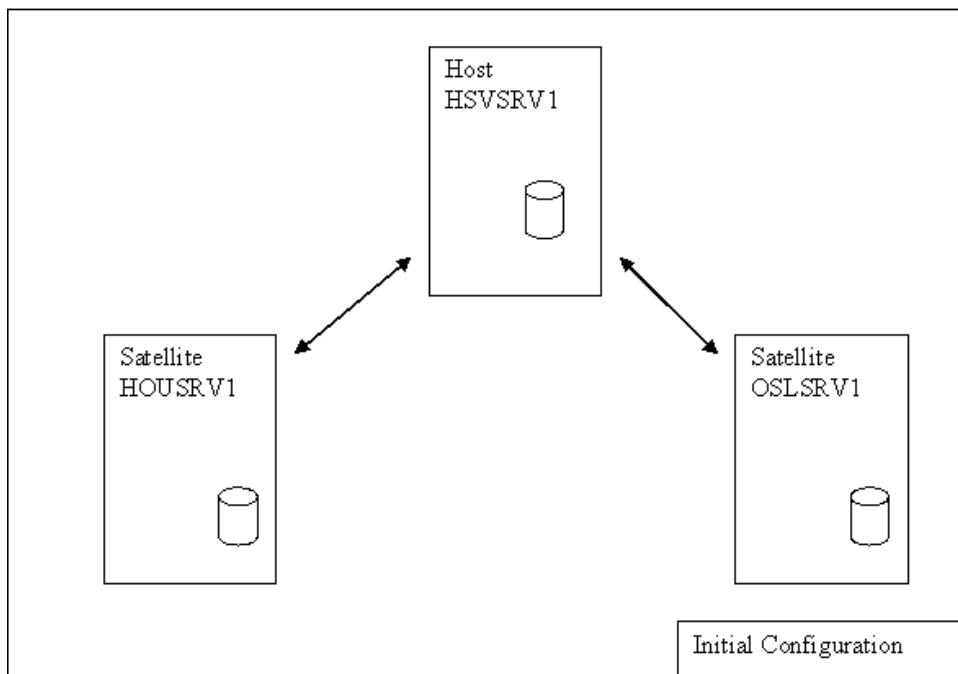
Remove

Removes all rows for the selected location from the **Locations and servers where model will be duplicated** table.

Back Up and Restore Global Workshare

In the event that one of the locations participating in a Global Workshare Configuration (GWC) must be taken off-line, Intergraph recommends using one of the following supported workflows to ensure minimal adverse impact to the remaining locations in the GWC. Each of the following scenarios presumes the following basic initial configuration:

- The GWC consists of three database servers, with each server functioning as both SQL Distribution and Data Server. For the purposes of these scenarios, the Host server is named HSVSRV1. The two Satellite servers are named HOUSRV1 and OSLSRV1.



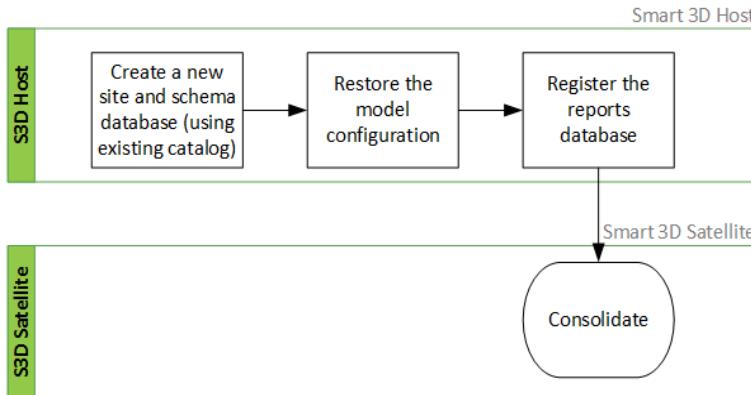
Scenario 1: Restore Model as Copy

When the Host location experiences a work stoppage, Intergraph recommends using this workflow to achieve a stand-alone configuration. For more information, see *Scenario 1: Restore Model as Copy* (on page 49).

Scenario 2: Amputate and Re-Duplicate

When a Satellite server experiences a catastrophic failure (but the Host location remains in-place and operable), Intergraph recommends using this workflow to restore the Global Workshare Configuration. For more information, see *Scenario 2: Amputate and Re-Duplicate* (on page 50).

Scenario 1: Restore Model as Copy



Use the following workflow when the Host server in a Global Workshare Configuration (GWC) is "lost" and can no longer participate in the GWC. This workflow requires you to use a backup of the Host databases that was completed while the GWC was in-place.

As part of the restore process for the model, the software performs the consolidation process. This is the same series of actions that you perform manually during the standard consolidation workflow; however, in this workflow, the software performs them automatically.

The databases that result from this workflow will behave as they would in a standard, non-workshare setup, and all permission groups are reset to the new Host location. The restored dataset is fully supported for future replication.

⚠ CAUTIONS

- Do not substitute the workflow in this scenario for the standard consolidation workflow as queued or error data will be lost.
- Do not deviate from the following sequence of steps. Additionally, do not proceed to a subsequent step in the workflow until the previous one is complete.

Create a New Site and Site Schema Database

Using the **Database Wizard**, create a new, empty Site and Site schema database on the Host server. Because you will be restoring the original Catalog and Catalog schema databases in a later step, create these new Site databases using an existing Catalog.

For more information on SQL databases, see Create site database from an existing catalog for SQL. For more information on creating databases, see the *Project Management User's Guide* available from **Help > Printable Guides**.

☞ NOTE The names of the new Site and Site schema databases are not required to be the same as in the backup set from the Host.

Restore the Model Configuration at the Host Location

Use the **Restore Wizard** to restore the Catalog, Catalog schema, and Model databases on the Host server from the backup that was completed prior to the work stoppage. For more information, see the *Project Management User's Guide* available from **Help > Printable Guides**.

NOTE When the restore is complete, review the consolidate .LOG file in the %temp% folder of the logged-in user who ran the restore.

Regenerate the Reports Database

Regenerate the Reports databases after the project databases are restored on the Host server.

NOTES

- The workflow outlined in this scenario can also be used to test the consolidation of the databases in order to pre-screen for possible errors without affecting the live dataset. Such pre-screening is useful in preparation of migrating data or for ensuring minimal downtime during consolidation. In instances where pre-screening is the objective, you must perform the workflow on a server that is *independent* of any of the servers participating in the live GWC.
- You can also implement this workflow for the purposes of conducting a design review. The databases participating in the live GWC can remain intact and operable, while the latest work from the backup set can be restored onto a laptop and presented in the design review.

See Also

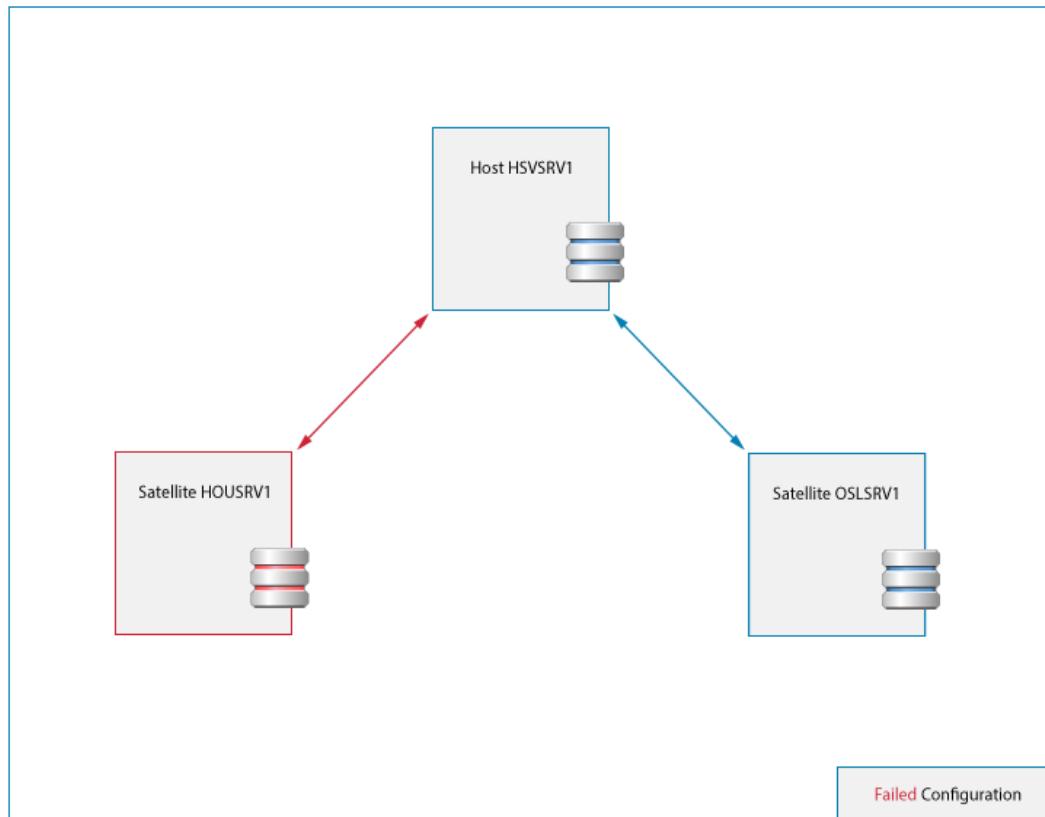
Back Up and Restore Global Workshare (on page 48)

Scenario 2: Amputate and Re-Duplicate

Use the following workflow when one of the Satellite servers participating in a Global Workshare Configuration (GWC) experiences a catastrophic failure and can no longer participate in the GWC. This workflow allows the GWC to remain active; only the lost Satellite location experiences an immediate work stoppage.

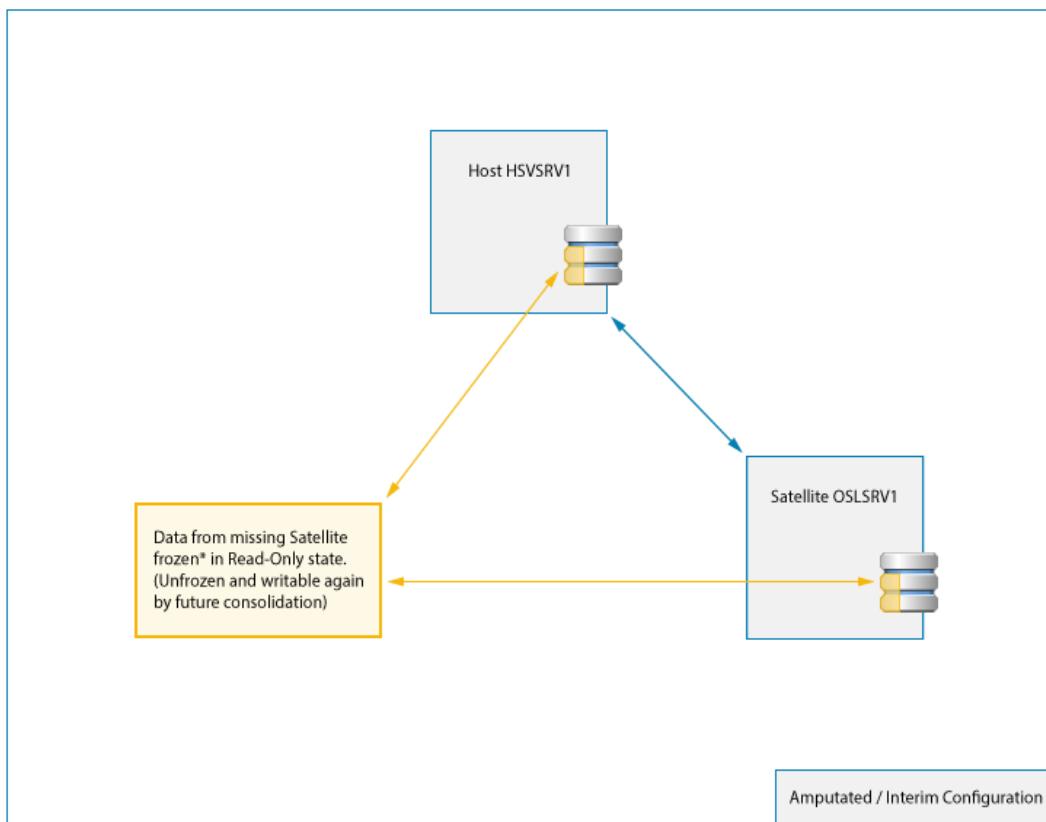
Remove Subscriptions / Streams to the Lost Satellite Server

Delete all subscriptions (MSSQL) with regard to the Satellite server to be amputated. For example, in the following configuration, Satellite server HOUSRV1 has suffered massive failure and will be periodically unavailable. As a result, SQL Agents for the Push Subscriptions HSVSRV1 > HOUSRV1 and OSLSRV1 > HOUSRV1 are failing.



★ **IMPORTANT** Permission groups cannot be moved and must stay with the "amputated" Satellite.

After the incoming and outgoing distributions are removed for the failed satellite, the resulting configuration resembles the following illustration:



In this scenario, the remaining Locations can continue participating in the GWC with no work stoppage.

Consolidate the Replicated Databases

As soon as it becomes practical to do so, perform the standard consolidation workflow to merge the replicated databases at the remaining Satellite locations to the databases at the Host location to form single database of each type.

Re-Duplicate to Include the Amputated Satellite Location

Use the standard replication workflow to re-duplicate the resulting consolidated dataset.

NOTE Because consolidation scripts only execute against the Host server, the absence of any Satellite is recoverable. As a result, you can extend the amputate and re-duplicate workflow to a situation involving multiple Satellite servers failing due to a broader network failure that has a long-term fix date.

See Also

Back Up and Restore Global Workshare (on page 48)

Failure and Recovery Overview

In the Smart 3D Global Workshare (GWS) environment, it is possible for a Host server or Satellite server to fail due to hardware or other catastrophic failure. The GWC Host Failure-Recovery and GWC Satellite Failure-Recovery workflows describe methods for recovering from such failures.

See Also

Host Failure and Recovery (on page 53)
Satellite Failure and Recovery for SQL Server (on page 33)
Catalog Data Recovery for SQL Server (on page 28)
Model Data Recovery (on page 54)

Host Failure and Recovery

The following workflow explains a procedure for recovering the Host server in a Global Workshare Configuration (GWC) environment in the event of a failure. A Host server can fail due to hardware or other catastrophic failure. The GWC Host Failure-Recovery workflow is not intended for temporary network outages from which the GWC can recover without intervention. If you have lost your Host location in a GWC, please contact Intergraph support (www.intergraph.com\support) for advice before you start the recovery operation.

★ IMPORTANT When the Host server fails, GWC data begins to accumulate on each of the Satellite servers. When it is clear that the Host server is down, stop work on each Satellite server until the Host server is repaired or replaced.

1. Determine which dataset to copy for recovery from the remaining Satellite servers. Use the most complete dataset available from the Workshare location.

★ IMPORTANT You must recover data from all the other Satellite locations that were not chosen using copy/paste and restore after the GWC is running again.

NOTE To integrate the data not chosen, see *Model Data Recovery* (on page 54).
2. Backup the dataset to be copied. For more information, see *Backup in Project Management User's Guide*.
3. Remove Smart 3D data from all servers that participated in the previous Smart 3D Global Workshare Configuration.
4. Create a new Site and Site schema using the **Database Wizard**. For more information see *Create Site Database and Schema Page* in *Project Management User's Guide*.
5. Populate the new Site using the backup dataset with the **Restore Model as Copy** feature in the **Restore Wizard**. For more information, see *Restore a Model as a Copy* in the *Project Management User's Guide*.
6. Backup the restored model. For more information, see *Backup in Project Management User's Guide*.
7. Configure Global Workshare. For more information, see *Global Workshare and SQL Server Databases* (on page 10).

See Also

Satellite Failure and Recovery for SQL Server (on page 33)
Catalog Data Recovery for SQL Server (on page 28)
Model Data Recovery (on page 54)

Model Data Recovery

In the event that Model data is deleted or modified, and you want to return to the previous state to recover the data, the workflow in this topic describes how to do so in a Global Workshare Configuration (GWC) environment. For this to be effective, regular backups must be conducted at each Workshare location.

Recover Data from the Model Database

1. Locate the most recent backup that contains the intact modified or deleted objects.
2. Connect to the GWC location at which the model data was deleted or modified.
3. In Project Management, select **Tools > Restore**.
4. In the **Restore Wizard** dialog box, select **Restore model for selective recovery of model objects**, and then click **Next**.
5. In the **Backup configuration file to restore** box, type the path to the backup configuration file (.BCF), or click **Browse** ..., navigate to the file location, and then select the file.

*The **Restore Wizard** dialog box is populated with the following information:*

- The **Model to restore** box displays the name, database size, and the date of the backup file for all the models saved in the specified backup location. The list is populated after you select the backup configuration file you want to restore. You can only select a single model to restore.
- The **Server and path to existing database backup files** table displays the server and database backup files path where the database backup files are located. Click **Browse** and navigate to the path on the specified server. **This option displays only when you are restoring a SQL database.**
- The **Paths for new databases** table lists the database types saved to the backup file, including the server (when restoring **SQL databases**), and paths for the restored database and log file.
- The **New model name** dialog box displays the restored model name with the date of the selected backup file (.BCF) as a suffix. The root object in the Model database is not renamed. You can change the name, which is especially useful for partial recovery at Satellite locations.
- The **Description** box provides a space for you to type a description of the restored model.

6. Click **Finish**, to restore the portion of the Model database to the existing model database as defined by the permission groups you selected.
7. In the **Restore model as Copy** dialog box, you are prompted to choose whether to link to the existing catalog. Select **Yes**.

⚠ WARNING You must select **Yes** at this prompt, or you will overwrite the Workshare Catalog for the GWC.

8. Use the **copy** and **paste and restore** options within the model to restore the objects to the previous state.

9. Open Smart 3D.
10. Open two Smart 3D sessions.
11. In one session, define a workspace with the workshare model.
12. In the other session, define a workspace with the model that was restored for selective recovery.
13. In the session with the workspace of the model restored for selective recovery of modeled objects, select all objects, and perform a **Copy**.
14. Switch to the other open session, which has the workspace defined for the model.
15. Click **Edit > Paste and Restore**.

SECTION 2

Permission Groups

A permission group is a portion of the model over which people have various levels of responsibility (or access rights). Use **New Permission Group**  in Project Management to create a new permission group. Each object that you create directly is assigned to the active permission group. An administrator can grant or deny multiple users or groups of users various types of access to each permission group, such as read, write or full control.

After you create the hierarchy for your model, you can use **Edit > Property** to view and change descriptive information about the permission group, including giving it a different name or modifying access permissions.

Defining Custom Permission Group Properties

As you refine your model hierarchy, you can define additional properties for the permission groups you create. Custom properties are intended for the common administration of the objects you create in the Project Management task. For example, you can define a description or contact person property. You use the **Database > Define Properties > Permission Group** command to create custom properties for your permission groups. Custom properties that you define apply to all permission groups in the model. Custom permission group properties that you define appear in the right pane of the Project Management task along with the object name and other system-defined properties when you select the a permission group in the left pane.

After you create a custom property, you cannot delete it. Although you can hide it using the **Delete** button on the **Define Permission Group Custom Properties** dialog box, the property remains part of the schema. Also, you can use the **Define Permission Group Properties** dialog box to change the name of a custom property, but you cannot change its type.

See Also

Permission Groups and Routing (on page 57)

Permission Groups and Global Workshare (on page 56)

Permission Groups and Global Workshare

Permission groups manage the read and write access to all objects across the host and satellite locations. At the host, you can create/modify permission groups for the satellite locations to have read or read/write access to various parts of the model data. In general, only one location can have read/write access to the model object at a time.

★ IMPORTANT

- Smart 3D system objects are exceptions to the rule that only one location can have write access to model objects. Users with write access to the permission group of a system can add children objects to it regardless of the location of the permission group. However, properties of the system object can only be modified by a user who has both write access and is at the same location as the system.
- The Drawings and Reports root node ignores location when determining accessibility. Users with write access to the permission group of Drawings and Reports root node can add children objects regardless of the location of the permission group.
- The space folders created on the **Space** tab of the **Workspace Explorer** when you first enter the Drawings and Reports task ignore location when determining accessibility. Users with write access to the permission group of the space folders can add child objects regardless of the location of the permission group. Children to these space folders are added when adding certain nodes in the Drawings and Reports task or when adding drawing volumes to the model.

When a permission group is created in a model participating in a Global Workshare Configuration (GWC), it is assigned a location. For a user working at **Location1**, only the permission groups that were assigned to **Location1** upon its creation are available. As the user places objects in the model, they are, in turn, associated to a **Location1** permission group. You can, however, use the Project Management task to change ownership of a permission group from one location to another. Also, a user in any location can transfer a selection set to a permission group in another location using the **Transfer** command on the **Configuration** tab of the **Properties** dialog box.

Permission Groups and Routing

Several different users in different permission groups can work together when routing if you know how the software handles the different situations. Piping fully supports different users who have different sets of privileges and work on different runs, such as when working in a Global Workshare Configuration.

The software creates an Intermediate End Feature (IEF) at the end of a pipe run connected to another pipe run and creates a logical connection between the two IEFs/runs. The legs stop at the IEF and are not shared between pipe runs. You do not need to create a separate permission group for the pipe run or the pipe run features. All piping objects can be in the same permission group.

Assignment of Permission Groups

Permission groups are assigned as follows:

- Objects that you create directly are assigned to the active permission group.
- Objects the software creates are automatically assigned a permission group determined by an internal set of rules. The permission group assigned is not necessarily the active permission group. Examples of automatically placed objects include connections and a pipe automatically inserted when two touching valves are separated.
- Parts generated by features are assigned the permission group of the parent feature; however, runs can be in a different permission group than their collective features and parts.
- End features use the permission group of the run to which they belong.
- Connections use the permission group of the parts to which they are connected. If the connection is between parts with different permission groups, the permission group to which you have write access is used. If the connection is between an equipment nozzle and a route part, the route part permission group is used for the connection.
- Piping connection objects (such as welds, bolt sets, gaskets, and clamps) use the permission group of the connection that generated the object.

Systems and Permission Groups

A system is a logical grouping of sub-systems. When you add or remove a sub-system, you also modify the parent system definition. Therefore, you must have write access to the parent system. You do not need write access to the grandparent system. For example, to create a pipe run, you need write access to the parent pipeline. However, you do not need access to the system to which the pipeline belongs.

When participating in a Global Workshare Configuration, you must manage all permission groups at the host site. The sub-system requirement for write access to the parent system is not possible if the sub-system's permission group is created at the satellite site and the parent system's permission group is created at the host site.

For example, your host site is Houston and your satellite site is London. You create a system called *Pipe Rack 100* and its controlling permission group is in Houston. You assign write access to a user who works in London. During the workshare replication process, the *Pipe Rack 100* system and permission group are duplicated in London. The user in London can add objects such as columns, beams, and braces to the *Pipe Rack 100* system because you gave that user write access to the system's permission group in Houston. The London user cannot delete or change any of the properties of the *Pipe Rack 100* system in London because the host site, Houston, owns it. He can only add objects to the system. If the London user travels to Houston and logs on there, that user can delete or change any of the properties of the *Pipe Rack 100* system because the Houston host site owns it.

Example Configuration A

In this example, two users, John and Peter, are working on the same run with exclusive access. John is responsible for part of the run, and Peter is responsible for the other part of the run. Neither John nor Peter should be able to modify the work of the other person.

The administrator should configure the permission groups as follows:

- Create three different permission groups: **PG-Run**, **PG-John**, and **PG-Peter**.
- Both John and Peter should have full control access to **PG-Run**.
- John should have full control access to **PG-John** while Peter should have read-only access to **PG-John**.
- Peter should have full control access to **PG-Peter** while John should have read-only access to **PG-Peter**.

The run should be created using the **PG-Run** permission group. When John works on his parts of the run, he should use **PG-John** as the active permission group. When Peter works on his parts of the run, he should use **PG-Peter** as the active permission group. The two halves of the run should connect at a component such as a valve (piping) or a union (electrical).

For example, John routes his part of the run, places a flange, and then places a gate valve. Peter then places a flange manually connecting to the open port of the gate valve, and then continues his part of the run.

Example Configuration B

In this example, two users, John and Peter, are working on different but in-line connected runs with exclusive access. For example, John places an elbow, a straight piece, and a union, then stops. Peter connects to the open port of the union, and then continues routing. The administrator should configure the permission groups as follows:

- Create two different permission groups: **PG-John** and **PG-Peter**.
- John should have full control access to **PG-John** while Peter should have read-only access to **PG-John**.
- Peter should have full control access to **PG-Peter** while John should have read-only access to **PG-Peter**.

John should create the run using the **PG-John** permission group and route his part of the run. When Peter works on his part of the run, he should use **PG-Peter** as the active permission group. The Intermediate End Features will handle the connection between the two parts of the run.

Example Configuration C

In this example, two users, John and Peter, are working on different runs connected by branching components such as a tee. The administrator should configure the permission groups as follows:

- Create two permission groups: **PG-John** and **PG-Peter**.
- John should have full control access to **PG-John**; Peter should have read-only access to **PG-John**.
- Peter should have full control access to **PG-Peter**; John should have read-only access to **PG-Peter**.

John creates an initial header run using **PG-John** as the active permission group and routes it as needed. Peter now wants to branch from John's run. Peter sets **PG-Peter** as the active permission group and selects the header in John's run from which to branch. Instead of creating the header component (such as a tee), the software generates a **To Do List** item for John.

When John updates the out-of-date **To Do List** item, the software modifies the header to add the tee, and then generates a **To Do List** item for Peter.

When Peter updates his out-of-date **To Do List** item, the software fixes the branch leg (the end of the branch leg is adjusted to the tee port). This is called a double hand-shaking mechanism.

Example Configuration D

In this example, an administrator has created two separate Windows® Active Directory groups, each with different permissions, under the model.

- The first Windows® Active Directory group, Group A, has been assigned write privileges to the permission group, **PG-1**. A user, John, is a member of this group.
- The second Windows® Active Directory group, Group B, has been assigned read-only access privileges to **PG-1**. John is also a member of this group.
- Because John is a member of Group A, which has write privileges, John therefore has write privileges to **PG-1**.

IFC Permissions at Satellite Locations

From Project Management at the host location, satellite users can be assigned *write* permission for the following interference checking (IFC) properties:

- Required Action
- Notes

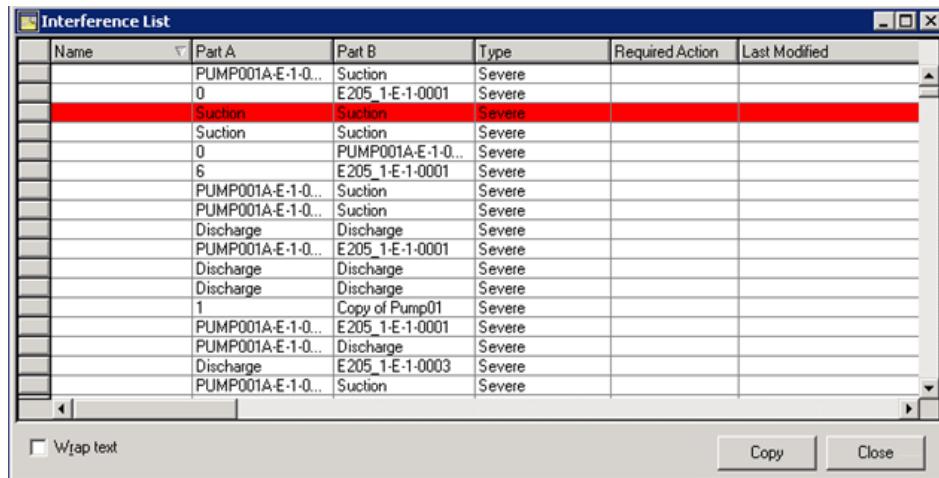
No other properties are editable from a satellite location.

Required Action and **Notes** properties are accessible from the following places:

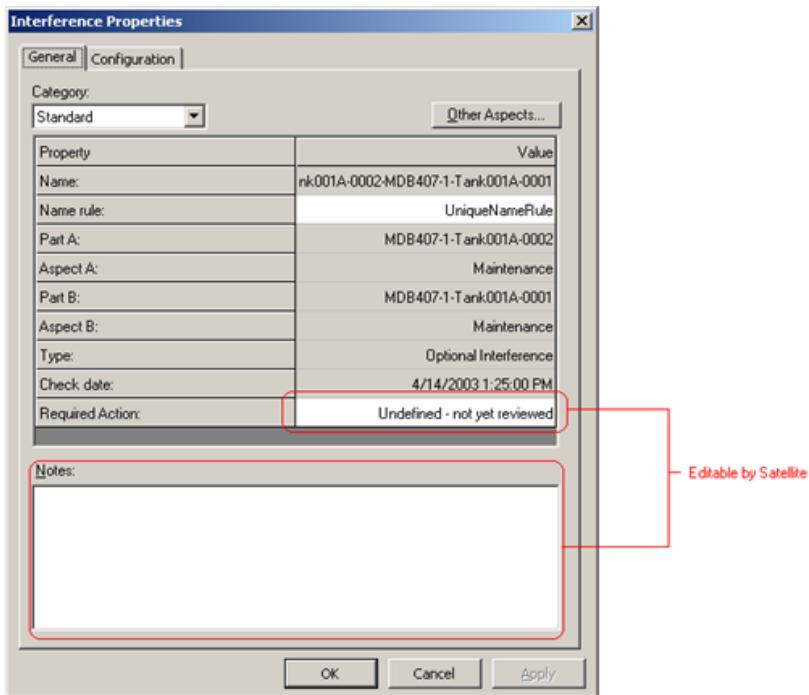
- **Interference List** dialog box
- **Interference Properties** dialog box
- **Local Interference Detection** ribbon

Interference List Dialog Box

The **Interference List** dialog box displays interferences from both the Local Detect Tab (Interference Dialog Box) process, and from database interferences derived from the Refresh Workspace or Define Workspace.



Interference Properties Dialog Box



Assign IFC Permissions at Satellite Locations

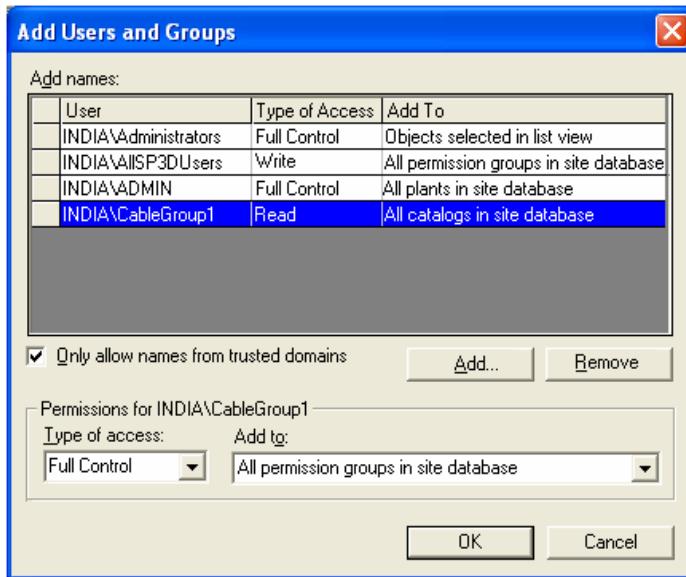
Satellite users who can edit interferences at satellite locations must have the following permissions:

- Write permission at the satellite location, that is, be a valid model user.
- Write permission to the IFC permission group at the host location.

No other properties are editable from a satellite location.

Permissions

The Host administrator can grant permissions to satellite users. If any satellite user is not from a trusted domain, the Host administrator clears the **Only allow names from trusted domains** check box in the **Add Users and Groups** dialog box. The host administrator then adds the corresponding user names.



Glossary

abstract part

A part that is only defined by a partial specification and that cannot be materially provided by the organization that defines the specification.

Active Template Library (ATL)

Set of class templates and wizards supplied with Microsoft C++ Version 5.0 and later. You can use an ATL when you create ActiveX controls and any other type of object that uses the Component Object Model (COM) model. Using an ATL is generally preferred over Microsoft Foundation Classes (MFC), because the implementations are smaller, easier to use, and more closely tied to the COM model.

angle

The circular measurement taken from the intersection of two pipes at a turn or branch.

approval state

Recorded state of acceptance of information contained in objects within the database. The approval states indicate a level of confidence in the information stored in the database and govern your ability to alter specific data about a product.

arrangement (accommodation)

Those components of a system arranged in three-dimensional space with accurate dimensional representation for installation. Various types include electrical, HVAC, machinery, outfitting, and piping.

attribute

A single type of non-graphics information that is stored about an object such as diameter or end preparation.

axis

An imaginary line used to define the orientation of a system or object normally defined in terms of an x-, y-, and z-axis. Some 3-D graphic objects have an associated axis used to define the center or axis for rotations.

basic design

Engineering definition of the model and its systems.

bill of material (BOM)

Hierarchical decomposition of a product into constituent assemblies and parts. Specific types of BOMs exist (for example, an EBOM is a bill of material from the point of view of an engineering department; an MBOM is a bill of material from the point of view of manufacturing).

bulkload

The process by which reference data in Microsoft Excel workbooks is loaded into the Catalog database.

catalog

Repository of information about components and materials used in construction. When you use catalog parts in the model, the software places an occurrence of the catalog part in the project. This occurrence is a copy of the actual catalog part.

Catalog database

The database that contains the reference data. Each model database can reference a different Catalog database.

chain

A set of continuous and tangent segments.

change history

Process of recording information such as who, when, and why for any given modification.

change management

Software features or manual procedures for managing the consequence of change. For example, software can support a change management feature to report drawings that need updating as a result of a change in a 3-D model.

change propagation

Ability of the software to intelligently modify dependent design information to reflect change in a higher order object.

class

Grouping of individual objects that share some very significant, common characteristics.

classification folder

A folder in the Catalog hierarchy that contains part classes. Classification folders are one level above part classes. The ClassNodeType and R-ClassNodeDescribes sheets in the Microsoft Excel workbooks define the classification folders.

codelist

A set of acceptable values for a particular property that can be referred to by an index number or selected in a combo box. For example, the codelist for the material specification allows you to select from a set of standard entries, such as ASTM A183-F316 Stainless Steel.

commodity code

A user-defined code that provides an index to parts in a catalog.

commodity item

A standard component found in a manufacturer catalog (an off-the-shelf component).

component

Physical part that a feature generates.

concurrent access

Ability of the software to allow multiple users to simultaneously access and modify the design of a model.

consolidated tasks

A collection of tasks run in batch. For example, the software allows you to extract a set of drawings immediately or to schedule the batch extraction for a future time.

constraints

A logical restriction that controls how part symbols ports relate to each other and to reference ports. There are four constraints: parallel, perpendicular, coincident, and distance.

contract

A Work Breakdown Structure object representing a scope of work, usually performed by an external supplier. The contract is related to a project and appears in the Work Breakdown Structure hierarchy.

coordinate

The location of a point along the X-, Y-, or Z-axis.

coordinate system

A geometric relation used to denote the location of points in the model. The most common coordinate system is the rectangular coordinate system, whereby points are located by traversing the X-, Y-, and Z-axes of the model. Normally, coordinate systems have their origin defined as 0,0,0.

cutting plane

A plane that cuts through an object.

damage records

Data relating to the damage and repair of structure or components that occurred during or after construction of a plant.

data interchange

Capability to output the design, or portions of the design, in a standard format for use or movement to another computer software system.

database

Repository for the product model data. The database contains information to describe individual objects in the data model and the relationships between objects as appropriate.

database backup

Process of recording a backup copy of the complete database or the incremental changes after the date that the last complete copy was created.

database break and recovery

Utilities used to restore a database after files are corrupted.

database copy

Functionality to copy large collections of model objects from one design project to another design project.

database management

Functionality related to managing a product model database.

database monitor record

Transactions that occur in order to provide database (DB) recovery after a stop in response with a minimum of lost data.

degree

The highest polynomial factor in the curve or surface mathematical definition. A line is a degree 1 curve, while a cubic B-spline is a degree 3 curve.

design alternative

Difference in a design represented by a separate version. A design alternative can be a new design prepared as a proposed change, or one of several elective options that the builder or customer selects. Each design alternative has an identification assigned so you can uniquely refer to the design alternatives.

design approval log

Record of review and approval of parts of the design.

design data auto input

Automation in loading existing design data into a new design database.

design documents

Drawings, sketches, material lists, procedures, and so forth that are generated during the design phase.

design object

Any object with properties that you can select. A design object can be related to one or more contracts of different types, but related only to one contract of a given type.

design progress check

Analysis of the content of the design to some metric unit that gives an idea of the degree of completion.

design review

Functionality to support rapid viewing of the design and markup of features with comments.

design service

Any general system services related to the design function.

design standard

Feature or object used in plant design that has been determined to the normal or approved way of accomplishing a design requirement. In the context of computer software, the term refers to computer functionality to support standards, not the standard itself.

detail schedule

Lowest level of schedule used to manage and track work progress.

distributed systems

Systems consisting of sequential parts with a distributive characteristic (for example, pipes distribute fluids, HVAC distributes air, cabling distributes power, and structure distributes loads).

distribution systems

Term synonymous and used interchangeably with the term distributed systems.

documentation

Drawings and other records that you must produce to document, obtain approval, or build the design.

drawing tool

Tool that helps in the process of creating, modifying, or manipulating objects. Examples are PinPoint and SmartSketch.

easting

A term that describes an east coordinate location in a coordinate system.

edge

A topological object that represents a trimmed curve bounded by a start and end vertex.

edge distance

The distance from the center of a bolt or rivet to the edge of a plate or flange.

equipment catalog

Catalog of equipment geometry and limited properties that the software uses to identify and visualize equipment and its placement in the model. The catalog is not the source for the total specification and ordering data for the object.

fabricate

To cut, punch, and sub-assemble members in the shop.

face-to-face

The overall length of a component from the inlet face to the outlet face.

fasteners

Bolts and rivets used to connect structural members.

element

Primitive geometric shape such as a line, circle, or arc.

fence

Boundary or barrier that separates or closes off an area. To surround or close like a fence.

field adjustment

Material added to the neat design geometry of piping or structural parts to allow for fit up in the case that extra material is required due to uncontrolled variance in the manufacturing and construction process.

flavor

A different variation of a symbol. Each variation has different occurrence property values.

focus of rotation

A point or line about which an object or view turns.

full penetration weld

A type of weld in which the weld material extends through the complete thickness of the components being joined.

function points

Part of the requirements documentation, function points are the smallest granularity of a requirement statement that describe specific detailed actions that the software performs.

functional block diagram

Schematic representation of a system (piping, electrical, ventilation) showing system parts and their relationship. You use symbols to represent equipment and components. A connecting network of lines illustrates their relationship. Taken together, the symbols and the network illustrate the function of the system.

furnishings

Parts such as movable articles and fittings that normally are not associated with a system (for example, a chair).

generic specific

Object that is parametrically defined or defined to suit a family of specific parts (for example, International Standards parametrics). For example, a 100 - 200 gpm pump in the catalog can provide a general shape to appear in the model until a specific object has been identified. See also specific and specific object.

GUIDs

Acronym that stands for Globally Unique Identifiers. The software automatically creates the GUIDs sheet in the Excel workbooks when you create the Catalog database and schema. The purpose of storing GUIDs within Excel workbooks is to help you keep track of what has been loaded into the database. Storing GUIDs also helps to avoid the situation in which a replacement Catalog database causes existing models to become invalid.

host location

The first location created for a Site. This host location is defined when the Database Wizard creates the Site database.

host server

The database server on which the Site database was created using the Database Wizard. Alternatively, if it is a restored database set, the Host Server is the database server where the Site database is restored. The Host Server in a Workshare environment contains the origin for the Site, Site Schema, Catalog, and Catalog Schema databases. Consequently, most Project Management and reference data work must take place at the Host.

initial design

Early stage of design work, generally before contract, used to estimate construction costs and provide a rough concept of the intended plant. Contains information relating to a plant created during its initial (concept) design period.

initial structural plan

Principal structural plan for the plant; also called a construction profile.

instantiation

Occurrence of a catalog object at a specific geometric location in the model.

interference checking

A process that identifies possible collisions or insufficient clearance between objects in the model.

job order

Industrial authorization for accomplishing work; synonymous with a work order.

kinematics analysis

Analysis of mechanical motion.

ksi

Kips per square inch.

leg length analysis

Preferred term is welding length analysis.

library

Resource of reference information that you can access in developing a plant design.

life cycle database

Information developed to assist in the maintenance and modernization of delivered plants.

link

Way to store information about another file in your document. You can update a link so that changes in the file appear in your document.

lintel

A horizontal member used to carry a wall over an opening.

load group

A grouping in which all components feature uniform load limits and stress safety characteristics. For example, if a pipe clamp from load group 5 has a maximum nominal load of 20kN, then so does a threaded rod from load group 5.

location

A Location is defined by three user-defined inputs: 1) a unique name, 2) a unique name rule ID, and 3) the server where the Site databases reside for that Location. A Location is defined and created when the Site database is created using the Database Wizard. Additional Locations can be created in the Project Management task. Each Location is a Site-level object, thus other Plants within the same Site collection can use the Locations when the Plants are configured for Workshare.

logical member

An object in the model used to represent the design topology.

machinery

Major pieces of equipment installed in a plant.

macro

A sequence of actions or commands that can be named and stored. When you run the macro, the software performs the actions or runs the commands. You can create the macros in Visual Basic or other OLE-aware programming applications. Some of the other OLE-aware programming applications are Visual Basic for Applications, Visual C++, and so forth.

maintenance envelope

A rectangular box around the part for clearance during maintenance operations.

maintenance records

Records of breakdown, repair, and overhaul of equipment.

material analysis

Analysis of a completed design work for extracting detailed material requirements; also called material lists.

material list

An option category that controls the format and content of the bill of materials.

methods

Objects in the database that describe the manufacturing methods to the component parts of a plant.

model

A graphical representation showing the construction of one or more systems in a plant or ship.

move from point

Starting point for an action. For example, when you move an equipment object, the Move From point determines the point of origin for the move.

move to point

Ending point for an action. For example, when you move an equipment object, the Move To point determines where you want the move to stop.

MTO neutral file

A non-graphic output file that can be fed into a material control system. MTO stands for Material Take-Off.

node

- One of the set of discrete points in a flow graph.
- A terminal of any branch of a network or a terminal common to two or more branches of a network.
- An end point of any branch or a network or graph, or a junction common to two or more branches.

northing

A term that describes a north coordinate location in a coordinate system.

nozzle

A piping connection point to a piece of equipment.

nozzle standout

The shortest allowable distance between the connection point of a nozzle and the start point of a turn on the leg connected to the nozzle.

NPD (Nominal Piping Diameter)

The diameter of a pipe.

object

A type of data other than the native graphic format of the application.

occurrence (of part or equipment)

Instantiation of a part of equipment in the model that refers to the part library; an instance of a specific object. The design can be built several times, and therefore the occurrence can apply to more than one hull. Typically, an occurrence points back to a specific object, either for its complete definition, as in the case of a particular valve, or for its made from material, as in the case of a steel plate part cut from sheets. Thus, when a designer selects a component from the catalog and places it at a location in the space of the plant, the software creates an occurrence of that object in the plant design.

occurrence property

A characteristic that applies to an individual object in the model. Occurrence properties are designated with 'oa:' in the reference data workbooks. You can view and modify occurrence

properties on the Occurrence tab of the properties dialog boxes in the software. Depending on the object, some occurrence properties are read-only.

origin

In coordinate geometry, the point where the X-, Y-, and Z-axes intersect.

origin point

The point at which the coordinate system is placed, providing a full Cartesian coordinate system with positive and negative quadrants. Points are placed at coordinates relative to the origin point, represented by the X, Y, and Z values.

orthogonal

The characteristic of an element consisting completely of elements positioned at 90-degree angles. A square is an orthogonal element.

orthographic

A depiction of an object created by projecting its features onto a plane along lines perpendicular to the plane.

P&ID

Diagram that shows the topology, functional components, and special requirements of a piping system; generally represents the engineering design of the system.

package

Set of closely related classes. (UML)

painting

Computation of paint surface and recording of paint system requirements.

parameter

A property whose value determines the characteristics or behavior of something.

part class

A group of similar objects. You can define part classes in the Excel workbooks. A part class can have multiple parts. For example, a heat exchanger part class can contain heat exchangers with different dimensions.

part number

Unique identifier of a part.

PDS (Plant Design System)

A comprehensive, intelligent, computer-aided design and engineering application for the process, power, and marine industries. PDS consists of integrated 2-D and 3-D modules that correspond to engineering tasks in the design workflow.

permission

The ability to access (read, write, execute, traverse, etc.) a file or folder. Each file may have different permissions for different kinds of access and different users or groups of users.

PinPoint

Tool that allows you to place, move, and modify elements with precision, relative to a reference point.

plant

A collection of modeled objects that can be simultaneously displayed and edited in a workspace. A Plant points to a Catalog (optionally shared with other Plants). Access control is managed at the Plant level.

plant configuration

The set of databases and files required for work in a particular Plant. Each Plant must have the following databases: Site database, Site Schema database, Plant database, Report database, Report Schema database, Catalog database, and Catalog Schema database. Each Plant also must have one shared file location for Catalog symbols and output files, such as drawings, specific to the Plant.

principle of superposition

The principle that states that the stresses, strains, and displacements due to different forces can be combined. This principle is only valid for linear analysis.

Product Data Management (PDM) System

Software intended to manage both product data and documents associated to the product data. Functionality typically includes: object-based data modeling tools, user administration, business rules, and document management. Document management typically includes document editing or reviewing, document mark-up or redline, document storage, and full-text retrieval.

product structure

Hierarchical breakdown or decomposition of a product into constituent parts, volumes, or units. (For example, a bill of material is one possible type of product structure.)

production planning

Functionality associated with the work breakdown and sequence of the construction of a plant.

promotion

Process of associating approval state with a product version. A product version begins its existence at a working approval state. When the version is at some level of maturity, its approval state is elevated to a higher approval state (that is, promoted). Then, further changes must be carefully controlled and generally require the data set demoted to a working state. One or more promotions can occur successively higher approval states (between working and approved) to represent various intermediate levels of review or progressive approval.

property

An essential or distinctive attribute or characteristic of a thing.

query select sets

Set of objects that are selected in a query or queries on the database.

reference data

The data that is necessary to design plants or ships using the software. Reference data includes graphical information, such as symbols. It also contains tabular information, such as physical dimensions and piping specifications.

resource estimation

Rough estimate of material, manpower, and facility utilization for the design and construction of the plant.

route

1) A line connecting a series of points in space and constituting a proposed or traveled route. 2) The set of links and junctions joined in series to establish a connection.

satellite server

The database server where the replicated databases reside for Workshare. The Satellite Server is not used unless Workshare is activated.

schema

A database that creates the structure of another database. For example, a schema specifies the queries, tables, fields, and data types in a database.

schema update utility

Functionality used to assist in processing existing product models to an updated database structure after you modify or add to the database structure.

session

Series of commands or functions that you carry out in a document.

site

The top level in the Project Management hierarchy. A Site configuration may contain several Catalogs, each shared by multiple Plants.

site administrator

Person responsible for managing the standards and general parameters for a given plant site within a Site database.

site setup

Functionality associated with establishing a new plant site or hull for design development.

sketch and trace

User interface for rough definition of a required design feature that typically works in a 2-D mode.

specifications

Contracted requirements for the plant.

stud

A bolt, threaded on both ends, used to connect components.

suspended floor

A concrete floor system built above and off the ground.

symmetric node

Type of vertex on a curve. A curve with a symmetric node has the same curvature on each side of the node. A handle can be attached to a symmetric node for editing.

system

A conceptual design grouping that organizes parts in hierarchical relationships. A system represents a functional view of the model and includes information such as system name, type, properties, and design specifications for the objects assigned to the system.

tag number

User-specific, unique number assigned to an object (for example, CV-101 for a control valve, HE-2002 for a heat exchanger).

target point

The origin for coordinate measurements displayed by PinPoint. You can position the target point anywhere on the drawing sheet or view.

tolerant geometry

A type of ACIS geometry - either an edge or a vertex - that is outside the tolerance for ACIS and requires special handling.

trimmed surface

A surface whose boundary is fully or partially inside the "natural" geometric definition of the surface. Some or the entire control polygon extends outside the face boundary.

trunk

Feature that quickly reserves space for the distributive systems and other systems that have a path. Along the trunk are stations that define the cross section and identify part or system membership.

unit/module modeler

Facility of the system to structure collections of equipment and components into a single identifiable object.

user attributes

A customized property in the reference data. The Custom Interfaces sheets in the Excel workbooks define these properties. You can list the customized properties on the individual part class sheets.

version control

Ability of the system to manage multiple versions of a single part of the design. Version control should support conditional analysis and promotion status, as well as alternate design features among hulls within a plant site.

vertex

A topological object that represents a point in the three-dimensional model.

viewset

Set of objects (usually a subset of the entire database) that a view operation uses. Membership or lack of membership for any object in a viewset does not affect the actual stored representation of the object, but only its availability or desirability for viewing in the current scenario.

weight and CG analysis

Routines that compute the weight of commodity materials as configured in a given design (for example, plate and pipe) and determine total weight and center of gravity (CG) for a collection of material and equipment, as well as the complete plant.

welding

Weld requirements for joining materials. Welding length analysis is the calculation of required weld dimensions; also called leg length analysis.

wirebody

A topological object that represents a collection of edges jointed at their common endpoints.

wizard

Software routine attached to an application that provides guidance and expert help to you to complete one of the functionalities of the application.

work content

Estimation development of metrics from the database that relates to the work hour content of the various construction units.

work order

Plant authorization for completing work; synonymous with a job order.

working plane

The available 2-D plane of movement for endpoint selection.

workset

Set of objects (usually a subset of the entire database) used in an interactive change, add, or delete operation. Membership or lack of membership for any object in a workset does not necessarily affect the actual stored representation of an object. However, you can change or delete an object in a workset that also results in a change or deletion of the stored object. Similarly, when you add a new object (not currently stored) to a workset, the software also adds the object container.

workspace

Area that represents the portion of the model data needed to perform the intended task and includes the user modeling settings.

workspace document

Document into which you can extract a portion of the model data for a user task.

Workspace Explorer

Tree or list representation of objects in your workspace.

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